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*Illustrated.

Professor Ripley's scholarly discussion of railroad construction finance, the first half of which is published in this issue of the *Railway Age Gazette*, mentions but does

Short not describe one plan of financing short railroads which has been quite successful Line both in Wisconsin and in certain states Financing in the Southeast. There are two forms

which this type of railroad financing takes. In Wisconsin, where the farmers are pretty well to do, and with good local credit and some political influence, quite a number of short roads connecting two or more lines of larger railroad systems have been built almost entirely by local enterprise and credit. In such cases the desire of the farmers is, of course, to provide an economical outlet for their products and to give them easy

communication with the markets from which they buy. The right-of-way is secured for little or nothing; the farmers along the line furnish a good part of the labor necessary for the grading, and through their local credit raise money enough to buy the materials that are necessary for the first light construction needs. After the road is in actual operation its credit, of course, is susceptible of somewhat further extension so that more equipment can be bought, and as the country grows the business of the line, which is a feeder of the main lines which it crosses, becomes great enough to permit of some return on the capital invested. Public opinion, of course, permits of the earning of pretty high profits even through the charging of very high rates. One or other of the lines which the feeder crosses may in time be induced to buy the property.

The other form that this type of financing takes is where the aid of New York bankers is obtained. This is more often the case

in the Southeast than in Wisconsin.

The Banker Those interested in building the line agree and to give free the right-of-way and to furnish considerable labor for grading, etc.

the Short Line In all about \$4,000 per mile is put into the property in this way. The bankers will then issue six to eight thousand dollars per mile of bonds which are an absolute first mortgage on the short line and have as equity the labor and right-of-way which was put into the property previous to the bond issue. The proceeds from the sale of these bonds are used to complete the road, and the bankers sell the bonds to their customers, retaining, however, the stock, which represents their compensation for doing what it would have been impossible for the farmers to have done for themselves. This stock may or may not be worth anything. If the road is successful and crosses two or more competing lines, it may well be that in five or six years the stock held by the bankers can be sold to one of these competing lines for a substantial sum. In this case the bankers have made a good profit, the farmers have got the line which they want, and one of the competing roads has got a feeder which it considers worth the price which it pays. The bankers, however, take a real risk, since if the road should prove entirely unprofitable and not be able to meet the interest charges on the bonds, the bankers must in the great majority of cases protect their clients to whom they have sold the bonds and therefore may have to face a considerable temporary loss, in addition to which they may never realize any profit. Both of these forms of railroad construction finance show a normal healthy development of the United States which may be well contrasted with some of the financing of construction on a larger scale which Professor Ripley cites.

In a paper read at the January, 1914, meeting of the New England Railroad Club, George M. Basford advocated a system to provide trained men for all departments of railway work.

Training Men A great deal has been done on some roads along the lines of apprenticeship for shop men, but after all, this work is confined to comparatively

few roads and little or nothing has been done in the way of providing trained men for other than shop occupations. E. J. Roth, general storekeeper of the Chicago, Indianapolis & Louisville, struck a note in accord with Mr. Basford's idea when he advocated, in a paper presented at the convention of the Railway Storekeepers' Association, at Washington, last week, an apprentice system for the store department. Like many other branches of railway work the store department has found it necessary to use foreign labor to a great extent, and it is seldom possible to obtain men of the right quality to fill such positions as those of foreman and storekeeper. On the other hand, very few young men of the right calibre can be persuaded to start in at the bottom as laborers without something pretty tangible in the way of future promotion in sight. In such a situ-

ation as this the logical solution would seem to be an apprentice system and there is no reason why a satisfactory method of training apprentices for store department positions cannot be developed as well as apprenticeship for machinists or boilermakers. The men in charge of the stores of a railway company have vast opportunities for instituting economies and the better the training such men receive, the more likely are such economies to be realized.

FOUR PENDING REORGANIZATIONS

THE Wabash and the St. Louis & San Francisco are in the hands of receivers; the Chicago, Rock Island & Pacific has defaulted on the interest on the railroad 4 per cent. bonds, and the Missouri Pacific has \$25,000,000 notes falling due on June 1, for which as yet it has made no provision for paying off. All four of these systems, therefore, are entering or already embarked upon a period of reorganization. The mileage of these systems totals 22,783, no inconsiderable percentage of the total mileage of railroads in the entire United States. No definite plan has been adopted for the reorganization of any one of the systems, but sufficient progress has been made in the study of the necessities of each case to show that the Wabash will need approximately \$30,000,000 new capital; the St. Louis & San Francisco, not less than \$60,000,000; the Rock Island, between \$40,000,000 and \$60,000,000, and the Missouri Pacific, \$35,000,000 immediately and \$50,000,000 within seven years. In the cases of the Wabash, Frisco and Rock Island the estimates are for additions and betterments, exclusive of refunding and for the Missouri Pacific the amounts are for refunding alone.

It may be assumed that in the refunding of the securities of the first three if the work of the reorganization is skillfully carried out, the present security holders can be induced or compelled to make favorable terms for the extension or exchange of their holdings. The new capital will either have to come from the security holders or from the bankers. There is no use of trying to gloss over the fact that each one of the four systems mentioned is overcapitalized. The Wabash and the Missouri Pacific were both burdened in the past decade with a capitalization which represents only in part money used for additions and betterments to those properties, the rest of the money having been used to help other Gould properties or to advance other Gould projects. The Chicago, Rock Island & Pacific Railway Company, which is the sound and solvent operating company, has piled on its back the indefensibly overcapitalized Rock Island holding company. The St. Louis & San Francisco, like the Gould roads, was made to bear the burden of the financing of projects other than the betterment of its own property.

It is unnecessary to go into the past history of these four properties except insofar as they directly affect the problems of reorganization. They all represent a phase and tendency of American railroad finance which there is reason to believe is definitely of the past; but the security holders of these roads and the public which they serve are faced with a problem which is of the present and the future. The details of a reorganization of a railroad property of two or three thousand miles, financed as all of these four roads have been financed by various and sundry expediencies without any comprehensive scheme and full to overflowing with conflicting interests, presents a problem so complicated as to lie wholly without the field of the present discussion. On the other hand, there are certain general underlying principles which can be observed or neglected in the reorganization of these properties which it is well to call attention to at this time, despite the fact that they are thoroughly well understood by those who are actively engaged in formulating the reorganization plans.

The reasons why most of the reorganizations of 1889 to 1893 were successful was because during the years that followed there was a tremendous expansion in the business of the country, a wave of prosperity in all lines of industry, and a freedom from governmental interferences of which there is no prospect in the

next ten years. For this reason a reorganization similar to that of the Baltimore & Ohio or the Northern Pacific would stand a small chance of being successful with the Wabash or the Frisco. It is absolutely essential, if the success of the reorganization of the four properties now in difficulties is to be based on anything more substantial than a hope for good luck, that the scaling down of fixed charges be drastic; that the amount of new capital to be put into the company be ample, and that in the case of all four roads the management of the properties after reorganization be entrusted to men whose sole object would be the building up of these properties. Furthermore, a very substantial margin of safety between fixed charges and minimum earning capacity must be assured. No one of the four properties is in bad shape physically. On the other hand, no one of the four properties has been kept abreast of the modern sciences of railroading, not through any mistaken ideas on the part of the operating management, but simply because of lack of money and of what have been considered the exigencies of the case.

Since the receivership the Wabash has had a considerable sum spent on it; just how wisely it is hard, of course, to say. The Wabash is not yet in by any means as good physical shape as its competitors.

The estimates of from forty to sixty million dollars as the needs of the Rock Island during the next five years at first apparently rather staggered some of the Rock Island security holders; but this is not an exorbitant sum and Mr. McKenna's report clearly indicates that the property is in good shape at present. As a matter of fact, it is in quite surprisingly good shape. If the officers of the Rock Island had had an amount of money to spend commensurate with the brains and ability they put in it, the property would compare favorably with the Union Pacific; but no amount of genius of management can succeed in making bare allowances for maintenance take the place of the large expenditures that should be made for reduction of grades, strengthening of bridges, etc.

The Missouri Pacific has been improved physically under the management of Mr. Bush; but here again able operation alone cannot take the place of new capital for capital betterments.

The Frisco, in spite of skillful and economical operation before the receivers were appointed, was in pretty bad physical condition, probably considerably worse than the Rock Island; but since the receivers have been in charge, and more money has been available, remarkable progress toward a higher standard of maintenance has been made, and at present the road is getting into good shape. But here again, as in the case of the Rock Island, even if the road can be brought up to 100 per cent. in maintenance, there still remain very large improvements which have to be made, and which will have to be paid for by the issue of capital obligations. These things emphasize the necessity for drastic reorganization which will permit not only of getting the properties out of their present holes, but giving them a firm basis on which to build a permanent structure.

It is hard to sympathize very deeply with the great majority of the holders of the stock of any of these companies.* Under no conceivable definition of the word could these stocks have been considered investments at any time within the past 10 or 15 years. They were speculations pure and simple and the speculator must be prepared to take losses as well as profits. The case of the holders of junior funded securities of these roads is a little different. The junior securities of all four roads were in most part sold by reputable bankers as what might be called semi-speculative businessmen's investments. This class of investor should be able to take a temporary loss for his ultimate gain. Since the only way that these junior securities can ever be developed into good interest paying investments is by a very complete change in the theory on which the roads have been financed heretofore, it would appear that in the long run holders of such securities would very much benefit by submitting to a quite severe present loss.

*This does not, of course, refer to holders of the minority stock of Chicago, Rock Island & Pacific Railway which was never exchanged for holding company stock and bonds.

There now remains the question of raising new money from sources other than the present security holders for the improvements which will have to be made. In this connection each property must be taken as a separate problem, although the problems of all four are intimately connected with the general attitude of investors toward railroad securities.

The Wabash was brought to its receivership through Gould methods of financing; but both Kuhn, Loeb & Company and the Rockefellers had considerable money invested in Wabash securities, and directly after the appointment of Mr. Delano as receiver, Kuhn, Loeb & Company formed a protective committee which solicited the deposit of first refunding and extension mortgage bonds, and while a second protective committee was formed, the Kuhn, Loeb & Company committee was able to dominate the situation, and the Wabash will be reorganized under the auspices of this committee. This means for the reorganized company very strong banking affiliations which have the reputation of dealing liberally with railroad companies with which they are connected and which have had better success in railroad financing than either Morgan & Company or Speyer & Company.

The Missouri Pacific, another Gould property, has approached various bankers in turn in an effort to refund its \$25,000,000 notes, and Kuhn, Loeb & Company, it is understood, were willing to act as bankers for the company on certain very rigid conditions. These conditions the Goulds were supposedly unwilling to meet. In 1911, when George Gould resigned as president of the Missouri Pacific, it was generally believed that an agreement had been made by which George Gould and the Gould estate were to retire from the active participation in Missouri Pacific management, which agreement, however, was not ratified by the other members of the Gould family, and therefore fell through at the last minute. The Missouri Pacific, even if the holders of the \$25,000,000 notes agree to a temporary extension, will be in a decidedly weak position if it fails to get the co-operation of Kuhn, Loeb & Company. This statement, of course, does not imply by any means that it is impossible for the company to work out its own salvation.

The St. Louis & San Francisco is affiliated with a group of St. Louis capitalists, of which the St. Louis Union Trust Company is probably the strongest member, and with Speyer & Company. Speyer & Company, if they are willing, are amply able to supply the needs of the Frisco; and while, of course, their greatest strength as bankers lies in their English and European connections, and the European market for Frisco securities has been rather badly hurt by the sale of Frisco refunding 5's just before the receivership, it appears probable that the reorganization of the Frisco will take place under the controlling influence of Speyer & Company.

The Rock Island situation is peculiar and unusually interesting. Judge Moore and D. G. Reid controlled the property for a number of years through a minority ownership, probably; or at least if not a minority ownership, a very slight majority. Their bankers were Speyer & Company. Phelps, Dodge & Company, who went into the management of railroads largely through the desire to get coal to their copper mines, and who were strong enough to hold the El Paso & Southwestern against the efforts of Mr. Harriman to get control of it, bought into Rock Island at the time of the Pearson-Farquhar syndicate fiasco in 1911. They now have, if not a controlling interest in the stock, at least a very large interest in it. This, of course, is in the stock of the holding company—the Rock Island Company. It is supposed that the railroad company 4 per cent. bondholders are very widely distributed here and in Europe, and the holders are hardly likely to be in a position to finance the future needs of the property. At any rate, the position of the Phelps, Dodge and the Moore-Reid holders of Rock Island Company stock is that while they are willing to submit to a heavy assessment, and while they recognize that the holders of Railroad 4's, if they so desire, could entirely eliminate them through the foreclosure

on the Railway company stock which is deposited under the Railroad 4's, this would be a shortsighted policy, since the road would then be left without financial resources to make the additions and betterments which are necessary to the complete development of the property. It would appear that if the Rock Island can get the proper financial backing, it is in the strongest position of any of the four roads.

MELLEN, MORGAN AND THE NEW HAVEN

IN whatever light the testimony of Charles S. Mellen before the Interstate Commerce Commission is viewed, the man himself presents a sorry spectacle. On his own showing, bravery and a nice sense of right and wrong are not his dominant characteristics. In the first place he may or may not be giving an unbiased account of the New Haven transactions. He acknowledges that he stood very much in fear of the indictment for manslaughter in connection with the Westport wreck. He claims to have shouldered the burden of an indictment in connection with the Grand Trunk's abandonment of its Providence extension in order to shield the late J. P. Morgan; but it seems to have kept him awake at nights. His present testimony, therefore, may be viewed either as an utterly selfish attempt to clear himself and to escape any possibility of prosecution, or as a perfectly frank, cynical exposition of the New Haven situation as it was while J. P. Morgan was alive and of Mr. Mellen's relations with it.

Reduced to the last analysis, Mr. Mellen has testified that with the title of president he acted as an agent without authority in the purchase of the trolley lines and of the New York, Westchester & Boston; that whereas the disbursement of \$11,000,000 for a property which was acknowledged to have cost in the neighborhood of \$4,000,000 was not entrusted to his hands, but was handled, according to Mr. Mellen, by J. P. Morgan, the disbursement of various sums ranging from a few thousand dollars to over \$2,000,000 for the influencing of legislation and publicity work in its least meritorious aspect was left to him; that he negotiated the sale of the Boston & Maine stock to John L. Billard and its repurchase at a loss to the New Haven of between two and three million dollars, but that he acted in accordance with the wishes of his directors and under the advice of counsel, and that in his dealings with Mr. Billard he got caught and, to use a slang phrase, "trimmed"; that in the purchase of the Sound steamship lines and the refusal to sell them to Charles W. Morse, he acted rather against his own judgment in an attempt to please Mr. Roosevelt and J. P. Morgan.

It is a very curious fact that so far as the fullest reports which we have examined show, there is not a single phrase of Mr. Mellen's which would suggest that he felt a duty as president of the New York, New Haven & Hartford to the thousands of small holders of New Haven stock. His conception of the public seems to be the cynical one that since the public elects the kind of legislators which are susceptible to "Prayers from the Hills," the public is deserving of whatever it gets; while he seems to have been so obsessed with a desire faithfully to serve Mr. Morgan as to have overlooked the fact that his real duty was to the stockholders of the New Haven.

One thing should be borne in mind—only one side of the matter has been heard, and that side has been presented by a man under the fear of personal prosecution and with the bitterness of failure rankling through his heart. Furthermore, many of the assertions of Mr. Mellen are quite possibly not susceptible of complete refutation because J. P. Morgan, on whom the chief responsibility is placed by Mr. Mellen, is dead.

The viciousness of a system of railroad management under which the president of the company is the mere hired man of a group of bankers has been often commented on in these columns, and if it is true that all of Mr. Mellen's acts were simply those of a hired man, the bankers were certainly unfortunate in the man whom they hired, and were extremely derelict in the

performance of their own duty of supervising the conduct of their hired men.

What are the remedies for such outrageous mismanagement as obtained on the New Haven when Mellen was its president? It is up to the financiers and railway executives of America to co-operate with public officials in finding an answer to that question. The New Haven is not the only railway that has been Mellenized, and such revelations as have been made regarding the financial management of some roads are enough to shake public confidence in railroad management in this country. The situation is worse than that. They are enough to shake the foundations of the confidence of the people of this and of other countries in the financial management of all kinds of business concerns in America, for the men directly or indirectly responsible for the mismanagement of railroads are as largely interested and as potent in manufacturing, mining and other industries as they are in the railroad business.

As has been repeatedly pointed out in these columns, and as can be conclusively demonstrated, it is only a relatively small minority of our railways which have been thus mismanaged. Most of them have been handled with more than ordinary prudence and ability, and for every one that has been conspicuously ill-managed there has been more than one that has been conspicuously well managed. But it is wrong that there should be any railways that are grossly mismanaged, and the fact that there are any reflects discredit on, and causes trouble for, all of them. The remedies are: First, a public sentiment that will hold directors of large corporations up to the performance of their duties as directors. Second, a proper sense of honor and responsibility among men of large affairs which will prevent them from accepting directorships when they do not intend to perform the duties of them and will cause them to perform the duties when they accept them. Third, public regulation of railway financing. The Hadley Railroad Securities Commission recommended the sort of legislation which should be passed. Certainly, when railways can be Mellenized there is need either for new legislation or for the enforcement of existing laws or both. The great danger is that the disclosures regarding the conduct of the Mellens, the Yoakums and the rest of their ilk, will cause the passage of more radical legislation than the conditions justify. If excessively drastic legislation shall be passed we trust that there will be no hypocritical wailing from Wall street about ignorant public hostility toward railways and about the public being misled by demagogues. The buccaneers in Wall street and the fools and cowards in Wall street who let the buccaneers work their wills are the chief authors of such legislation. It is a toss-up whether the demagogues or the highbinders of finance are doing the more to bring all the details of business under the regulation of public officials. Eugene V. Debs, Morris Hillquit and Upton Sinclair think that they are the real leaders of the socialist movement in this country. They take themselves too seriously. The real leaders of socialism in this country are such men as Charles S. Mellen, B. F. Yoakum and the directors of the New Haven, Frisco and other roads who are too crooked, cowardly, indolent or incapable to perform the duties of their positions.

NEW BOOKS

Tests of Metals at Watertown Arsenal. 144 pages. 5 3/4 in. x 9 in. Illustrated. Published by the Government Printing Office, Washington, D. C. Bound in cloth.

This book is a report of the tests of metals and other materials made with the United States testing machine at Watertown Arsenal, Massachusetts, during the fiscal year ended June 30, 1913. It contains a great deal of valuable information, considerable of which is arranged in tabular form, while a number of diagrams are included. Microphotographs of different metals are given and the half-tone work is exceptionally good.

Letters to the Editor

DIFFERENCES IN DESPATCHING CONDITIONS ON DIFFERENT ROADS

OKLAHOMA CITY, April 11, 1914.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

The discussions in the *Railway Age Gazette*, first brought out by the practice on the New York, New Haven & Hartford, concerning the use of the straight meet order for the handling of trains of the same class as being safer, reducing delays and saving work for the despatcher, are interesting to read, but for the benefit of the inexperienced the matter should be gone into a little further. The physical condition of the railroad would have to be taken into consideration to substantiate the assertion concerning superior safety. On a line where there are sufficient operators—and I presume they are plentiful on the New York, New Haven & Hartford—the meet order is all right and quite a lot of work can be saved the despatcher by so handling his trains. On the other hand where the offices are far apart, as in this western country, sometimes being as much as 40 to 60 miles, the meet order is not to be considered; in fact, trains cannot be handled advantageously with it and the right of track and time order must be used almost exclusively. The argument that some train and enginemen do not understand the forms is not the fault of the order but of the employing officer; there is nothing complicated about such a form and a man who does not thoroughly understand it has no business in a position requiring the handling of train orders. If the proper form of orders is strictly adhered to by the train despatcher there is no excuse for a misunderstanding.

Despatchers should make things as simple as possible for all concerned. Young despatchers, and sometimes old ones, practice what they term "fancy work" by putting out long and involved orders. Then these forms are referred to some authority for a ruling. Every month the *Train Despatchers' Bulletin* and the *Conductors' Magazine* contain copies of orders sent by some one asking for the editor's ruling. Trainmen, also, have a duty to stick to simple conditions and sound principles. The men read these printed controversies and discuss them among themselves, and become burdened with the subject. They had better put the same amount of time on their book of rules. The right-of-track and wait orders are just as simple as the straight meet. For instance, there is a territory of 40 or 50 miles without an operator and two or three trains to move over it; and possibly a turn-around to some mine or other industry; what could you do with the meet order? Only tie up the railroad. It may be said that such condition should not exist: but it does, and on some of the best railroads in this part of the country.

Plain forgetfulness is a worse danger than technicalities of wording. I have no idea what the statistics would show, but after an experience of twenty years, I venture to say that there have been as many straight meet orders overlooked as of the other kind; and as many or more accidents have occurred where the trains affected had no orders of any kind, but were simply running on time table. If men cannot run their trains according to time table what may be expected of them when handling train orders?

This letter is not intended as a criticism of fellow employees in any department for the mishandling of train orders, but simply to say that, as far as safety is concerned, one form of order is as good as the other.

A. C. D.

TRAFFIC ON A URUGUAYAN CITY'S STREET CAR LINES.—In the calendar year 1913, the three street railway companies of Montevideo carried 89,165,769 passengers as compared to 80,989,094 in the previous year.

Railroad Construction Finance in America

A Comprehensive, Unbiased Study of the Methods that Have Been Used to Raise Money for American Railroads

BY WILLIAM Z. RIPLEY

Ropes Professor of Economics, Harvard University

The first railways in the United States were built from the proceeds of subscriptions to capital stock. All of the smaller roads radiating from Boston were thus financed. The Boston & Lowell issued no bonds for twenty years. The Boston & Providence, constructed in 1849, put forth bonds after a time aggregating about one-fourth of its share capital; but by 1865 had practically extinguished this mortgage indebtedness. Many other small New England roads even today have almost no bonds outstanding. Nearly three-fourths of the entire capital of the Boston & Albany up to 1908 was still stock. These conditions are all vestiges of the earliest practice in railway financing in this part of the country. Elsewhere much the same practice prevailed at the outset. The Baltimore & Ohio was largely financed by stock issues, a goodly proportion subscribed by the state of Maryland. The annual report of the road for 1844 showed \$7,000,000 capital stock as against only \$985,000 of bonds. The share capital of the Lackawanna road in 1854 was double its mortgage bonds. The New Jersey Railroad a year later was bonded for only about one-fourth of its share capital. And for the United States in 1855 the capital stock of all its railways exceeded the bonded indebtedness by 42 per cent. Even as late as 1868, after new styles in railroad finance had come into vogue, the capital stock of the railways of Ohio considerably exceeded in amount the aggregate of their outstanding bonds.¹ The southern states, led by Virginia, gave most of their aid in early days by direct stock subscriptions. This Commonwealth alone took about \$21,000,000 par value before the Civil War. Some of the early western roads, especially those like the Atchison financed from Boston, depended largely upon funds raised from the issue of shares rather than from the sale of bonds. The first attempts at financing the Union Pacific were so fashioned. The first Federal Act authorizing construction of the Northern Pacific in 1864 actually prohibited bond issues—a restriction which had to be removed five years later.² As will be seen, a radical change took place in subsequent years. This was in part, especially after 1865, due to public aid given in the form of bonds; but it was also a change rendered almost inevitable by the general conditions under which capital for transportation purposes had to be raised.

The early practice of building by direct subscription to the capital stock of the company was satisfactory enough in the well settled region of the eastern states. But no sooner did construction begin to extend into undeveloped territory than a new situation arose. The old plan had several manifest advantages. In the first place, it fixed responsibility directly upon the shoulders of the stockholders. By becoming the sole losers in case of mismanagement, a gage was given to the public for honesty and efficiency. Moreover, in case the enterprise exceeded the original estimates as to cost, additional resources were at command through loans secured by mortgages upon the line already built. But, on the other hand, this safe and simple plan was open to a number of objections revealed by bitter experience. The first of these was that the inevitable risk in novel enterprises or in the invasion of virgin territory, called for a corresponding promise of large and quick returns. In other words, such enterprises instead of being solid investments, appealing to a substantial local constituency, were essentially speculative. However great might be the local interest, most of the funds, except the land, must be obtained from remote capitalists in the eastern

states or in Europe. The competition for such capital in view of the great opportunities for development was keen. Bonds might, perhaps, be sold as conferring the security of a mortgage, but even they must be accompanied with inviting bonuses of stock.

In the second place, the plan of direct stock subscription was defective in that it failed to utilize the resources which a wise use of credit afforded. If a portion of the capital could be had on a secured-loan basis of six per cent. and made thereafter to earn ten per cent., with the resultant margin left over for the shareholders, it was certainly poor business to continue to raise all the funds on a direct subscription basis which called for a uniform rate of return of eight per cent. on the whole capital employed. Under the old plan all the capital shared alike in risks and profit. Under the new plan of a divided capitalization, one portion being guaranteed a modest return and protected against loss, was issued on an assured investment basis; the other portion, speculative in nature, was dependent upon the success of the enterprise for its return. Its chances of loss were not negligible; but its hope of large returns was inviting. This fundamental principle in finance, of a division of capital into two such distinct parts, was overlooked in the early simple practice.³

A third disadvantage of the simple plan of financing by stock issues alone, was that it made no provision for immediate profits to the promoter. The demonstrated success of the enterprise must be awaited in order that the stock should rise to a premium above its issue price. This presupposed a large command of capital and a permanent or long-time identification of the builder with the subsequent operation of the property. Unfortunately railroad building in the past too often fell into the hands of entirely irresponsible promoters, interested solely in the profits of construction, and impatient thereafter to pass on to other fields of activity. To them the plan of stock subscription at par was altogether uninviting. Even if they possessed any means, it was simpler to risk other people's capital than their own. On the other hand, a prime difficulty in financing solely by means of mortgage loans upon the railroad property as brought into being, lay in the fact that much preliminary expense in the way of surveys, estimates and other engineering work together with options upon the right of way and necessary terminals, had to be incurred before any revelation of the project was possible; and, of course, long before there was any property which could be made the basis of an issue of bonds. Some expedient was necessary at the outset to raise funds for these purposes. The risks in this connection were, of course, peculiarly great because it was always possible that the plans on maturity would establish the impracticability of the entire enterprise. In such an event the promoters stood to lose every penny which had been expended in connection with the affair.

Legal considerations of weight constituted yet another objection to the early plan of construction solely from the proceeds of capital stock. Inviting subscription by offerings of stock at a discount—in other words, issuing it for less than payment in full at its par value—entailed certain inconvenient consequences in case of failure of the enterprise. In the eyes of the law, liability of the shareholders of a corporation toward creditors in case of bankruptcy or fraud, had taken the place of the former individual liability of partners. The familiar statutory provision that funded indebtedness should not exceed the amount of capital stock

¹ Gephart, Columbia University Studies, XXXIV, 1909, p. 168.

² Cf. the early history of the Northwestern, *infra*.

³ Admirably stated in Greene's Corporation Finance, 1902; and in Lyon, Capitalization, 1913.

also gave expression to this theory that there was a direct correspondence between share capital and assets. Consequently innocent shareholders were sometimes penalized through being held liable for the difference between the face value of their shares and the price below par at which they had been issued. Yet while the courts would thus hold the original shareholders assessable, such liability did not extend to third parties. An expedient was therefore necessary in order to make the general public "innocent holders for value." This could be done by the interposition of a finance company between the railroad and the subscribing public. The railroad might then issue its securities to this company in exchange for services and property in any proportion at the discretion of the directors. This operation in effect made the stock full paid and without further liability for issuance at a discount, just as if the par value had been paid for in full by cash. The intermediary corporation set up for this purpose was generally known as a construction company. It might, of course, actually build the road and often did so; but fully as often it sub-let the actual contracts. Not infrequently also in later years the construction company contributed to the evasion of hampering stipulations as to "after-acquired" property in general mortgages, in raising funds for branch line construction.⁴ All of these services are financial rather than physical. This point cannot be too strongly emphasized. The construction company is a fiscal and not an engineering concern. It is an intermediary, standing between the railroad and the contractors. Consequently the absence of a construction company, as in the case of the St. Paul (Puget Sound) extension, does not necessarily mean that a railroad projecting an extension actually does the work itself. In either case professional engineering and contracting firms usually build the road.

The normal operation of a construction company nowadays may be made clear without specific figures.⁵ A corporation is formed with a cash capital sufficient in amount to undertake the preliminary work. This company enters into an agreement with the railroad by which it is to receive stated amounts of bonds and stock upon each section of road as completed. It proceeds forthwith to build the line to the limit of its cash resources; and progressively receives the securities from the railroad as provided in the contract. These securities might, of course, be at once offered to the public (as indeed seems to have been done in the Colorado-Utah case on the Denver Northwestern in 1902⁶). But inasmuch as a more favorable market would be had on completion of the work, the construction company more often makes use of the railroad securities as issued to secure temporary loans based upon these as collateral. With the funds thus raised, equal to 60 per cent., more or less, of the face value of the railroad securities deposited, fresh funds are obtained for another section of construction. Hereupon the same financial operation is repeated. The additional railroad securities received in payment for work done, are once more made the basis of new loans. Thus the process is repeated to the end.

The wind-up has to do with the final disposition of the securities in the hands of the construction company. The road is presumably now completed and in operation. The bonds last received and presumably unpledged are sold, with or without bonuses of stock as the case may be; and with the proceeds the temporary loans next in line are repaid. These, in turn now released, are used to clear up the next layer of indebtedness. Loan after loan is thus paid off, leaving the construction company at last with sufficient cash to settle with its own shareholders, distribute its assets and dissolve. These assets consist of two distinct portions. The first is the profit in cash from sale of bonds over and above the construction cost of the property. The other part is the residue of the capital stock of the railroad, left over after giving the necessary bonuses to promote the sale of the bonds. An essential of successful promotion, however, is

the reservation, after meeting such requirements, of a controlling interest in the capital stock as a whole. This has usually been possible under the liberal statutes of most states. Little or no cash payment for stock at issue being necessary, the amount could readily be made large enough to meet all possible needs. The final act preceding dissolution is to parcel out these holdings of railroad stock among the shareholders of the construction company. Or, on occasion, this share capital may be held *en bloc* by means of a voting trust or other agreement.

The foregoing description is not altogether typical historically. In a measure it presupposes a group of capitalist-promoters already in possession of or commanding large funds. For the construction company launches forth upon its career with a considerable paid-up cash capital to meet preliminary expenses. Suppose, as in the early days and sometimes at present, the promoter having few resources, must in the first instance secure the capital for the construction company itself. Or he may conceivably have funds, but may desire to minimize his own risks at the expense of outside investors.⁷ This primary difficulty of financing the construction company, for example, seems to have been great in connection with the building of the Kansas City, Mexico & Orient Road since 1900. The most inviting layout of securities was offered to investors, principally European, in connection with this striking enterprise in order to interest them preliminarily.⁸

In order to appreciate fully construction company practices in the early days, one must imagine a company of promoters not only devoid of capital but without any considerable assets in the way of character. The border line between speculation and fraud is sometimes ill defined. But, to say the least, these two unfortunate features of speculation and fraud were too often associated with operations of this kind. From this circumstance the construction company has fallen into an ill repute, not, perhaps, wholly deserved. The following hypothetical example would seem to correspond pretty closely with the methods of the notorious Credit Mobilier and other companies concerned a generation ago in the construction of our transcontinental roads.⁹

A knot of promoters planning an enterprise, first formed a railroad corporation and authorized, let us say, capital stock to the amount of \$1,000,000. This consisted of 10,000 shares, par value

⁷ The avoidance of undue personal liability seems to have been the only motive actually revealed in the New York Hepburn Committee investigation of 1879 in connection with the construction contracts of the elevated roads by the New York Loan and Improvement Company. This finance concern was the intermediary, its large stockholders being also directors of the railroad, which issued its securities through this medium in exchange for completed construction. (Vol. II, pp. 1-135.) The Contract and Finance Company and the Millbrook Company, in the New Haven promotions, exercised functions not yet disclosed.

⁸ For example, two construction companies were concerned in building the Kansas City, Mexico & Orient Road. The invitation to subscription to their capital stock contained the following estimates as to the division of assets of the construction company on completion of the work. For each 100 shares of Union Construction Company (selling in 1910 for \$13,000) investors were promised as follows:

\$18,000	K. C. M. & O. 1st mortgage 4s (bonds).
\$18,000	K. C. M. & O. 4 per cent. preferred stock.
\$16,000	K. C. M. & O. common stock.
\$ 6,666	K. C. M. & O. town site stock.

\$58,666

Similarly for each 100 shares International Construction Company stock there was promised on dissolution:

\$17,225	K. C. M. & O. 4 per cent. bonds.
\$16,940	K. C. M. & O. 4 per cent. preferred stock.
\$12,600	K. C. M. & O. common stock.

In addition to the above, each share of construction company stock received as a bonus:

5.5 shares	Mexican Timber Field Company.
20 shares	Rio Grande Coal Fields Company.
800 shares	Mexico & Orient Town Site Company.
10 shares	Chihuahua & Sinaloa Development Company.
20 shares	Sierra Madre Development Company.

These extra bonuses for each 100 shares of construction company stock aggregated \$56,402 par value. (Wall Street Journal, March 10, 1910.) Subsequent proceedings in connection with reorganization have resulted in an elaborate agreement of January 15, 1914, as to the conflicting claims of the railway and construction company to these assets.

⁹ On the Credit Mobilier two elaborate government reports of 1873 are available: Wilson Report, 42nd Cong., 3rd Sess., H. R. 78; and the Poland Report, 42nd Cong., 3rd sess., H. R. 77. White's history of the Union Pacific Railway, 1895, is the best secondary source. Details are reprinted in Chap. IV of our Railway Problems. (Rev. ed.) The so-called Jay Cooke "pool" was the original construction company on the Northern Pacific. Oberholtzer, II, pp. 157 and 244.

⁴ Lyon, Capitalization, p. 121.

⁵ Meade, Corporation Finance, 1910, p. 114, gives an admirable example with detailed figures.

⁶ The construction contract is reprinted in Meade, *op. cit.*

\$100. This stock was issued to themselves part-paid (\$10 per share)—\$100,000 in all being temporarily borrowed for the purpose. A glowing prospectus then offered for sale two millions of bonds with the proceeds of which the road was to be built. These bonds were sold at 80, with perhaps a bonus of stock thrown in, thus realizing \$1,600,000 in cash. From this the promoters reimbursed themselves for the \$100,000 already advanced, by charging a five per cent. commission for placing the loan. This left \$1,500,000 cash in the treasury of the railway corporation as well as a controlling portion of its own capital stock. The next step was the organization by these same directors of a construction company, which built the road for an actual outlay of \$1,200,000. The railway directors now voted to pay their construction company \$1,500,000 in cash for this work and in addition the remainder of the share capital of the road. A profit to themselves of \$300,000 plus the prospective value of the capital stock which had cost them nothing, obviously resulted. If the enterprise were henceforth profitably operated, all well and good. If not, it might fail even to pay interest on its bonds. If bankruptcy ensued, a receiver, possibly representing the old stockholders rather than the bondholders, was appointed. In any event the promoters had realized 300 per cent. on their first investment, itself borrowed, from the profits of the construction company. Moreover, they still controlled the railroad through its capital stock. Thus were the foundations of a number of large fortunes laid; enough, that is to say, to envelop American railroad construction in an atmosphere of disrepute by no means generally deserved.

Anticipated profits from speculation in land along the proposed right of way were an important inducement to the construction of railroads in the early days. "In imagination every acre of land from Walker's Point to Snake Hollow has been plowed, sowed, fenced and is bearing forty bushels of wheat," says an early newspaper critic in Wisconsin in 1854. The promoters having decided upon their location, either purchased or pre-empted the most desirable tracts. From the sale of these, either to the railroad company for terminals or to the general public for town sites, ample returns for the risks of pioneering were expected.¹⁰ The honestly conducted enterprises gave the full benefit of these land dealings to the railroad company; the fraudulent ones reserved the profits to the promoters. It is indubitable that without the profits from land sales, the construction of railroads would have been greatly delayed in the early days. It is also clear, however, that in some instances the railroads themselves were materially damaged by participation in matters of this sort. The Lake Superior and Puget Sound Land Company operations were inextricably entangled with those of the Northern Pacific at the time of its downfall in 1873. It would take us too far afield to attempt to deal with the details of these land operations in recent years. Sometimes where the officers of the railroad have honestly shared the profits of their sagacity and foresight, as in the case of the Great Northern ore lands in 1906, no criticism may be directed against current practices. But when, as in the case of the gutting of the "Frisco,"¹¹ those in control of the railroad made secret profits of \$900,000 out of the Brownsville and other extensions, the utmost condemnation is merited. There is an interesting possibility¹² that the Millbrook Company which played some part in the collapse of the New Haven system in 1912-13 was in reality engaged in real estate speculation along the line of the newly-constructed Westchester road out of New York City. Over \$3,500,000 not otherwise accounted for by the directors seems to have been turned over to this concern.¹³

The plight of the bondholders of a prematurely or dishonestly constructed railroad in the early days was unfortunate.

¹⁰ Hessler, *Railroad Rings*, 1876, gives a number of concrete examples; also Oberholtzer, *Jay Cooke*, II, 162-330.

¹¹ 63rd Cong., 2nd sess., Sen. doc. 373, p. 62.

¹² Mass. Public Service Commission, Opinion, Oct. 14, 1913, p. 14.

¹³ The Interstate Commerce Commission has been directed by the Senate to renew its examination of such details. Morgan & Co. published certain facts on March 9, 1914.

Even if the receiver on taking possession truly represented their interests, the road might not have been completed through to an advantageous terminus. It might run up a tree, miles from connections or sources of traffic. Possibly, as on the Union Pacific, the parent company might have guaranteed interest or dividends on branch lines, the stock of which was still held by the promoters.¹⁴ Necessary terminals, bridges or ferries might also be separately organized as corporations owned by the old directors. An inadequate supply of equipment, cars and locomotives might seriously embarrass the road; or the rolling stock might be controlled by a car trust, officered by the original promoters. Interminable delay and monumental legal costs in disentangling the conflicting rights of different classes of security holders, might make it expedient to agree to a compromise with all these blocking interests. Such might be the most practicable and the cheaper policy; and from this compromise, those originally entrenched in the enterprise might wrest still further profits.

Peculiar difficulty, even with the best intentions, attends the keeping of construction accounts in such manner as to show the true condition of affairs. Routine operation must often be carried on for a considerable time on the completed portion of line, while construction is under way at the rail head. It is difficult at best to keep the two affairs separate. Failure to distinguish them in the accounts leads to confusion and oftentimes invites manipulation. To cite only one detail, how shall the large volume of traffic in construction supplies be cared for? Shall it be charged full rates and credited to operation, or carried free as an item of construction cost? The only safeguard is to entrust the new work to a distinct corporation devoting its entire energies to that purpose. Thereafter from time to time settlement may be effected between this concern and the already operating properties. One of the serious abuses of early unstandardized railroading may be described in this connection. It had to do with juggling of the construction account, particularly with the item on the assets side of the balance sheet denominated "cost of road." The method may be described by the following illustration. Suppose the earnings of a railway to be \$1,000,000. If its operating expenses be \$600,000 for the same period, the "operating ratio," so-called, will be 60; that is to say working expenses amount to this percentage of earnings. This operating ratio, showing the proportion of income left over after paying expenses, might be changed arbitrarily at any time by varying the definition of expenses of operation as distinguished from addition to capital. Suppose \$200,000 to be the cost of some permanent improvement, such as a steel bridge, heavier rails or possibly a new piece of line. This item of \$200,000 if paid for out of earnings, that is to say, merged in the routine expenditure of the road, would raise the cost of operation to \$800,000. The operating ratio would then become 80 and the road would appear to be in a somewhat languishing condition. If, on the other hand, the \$200,000 above mentioned were charged to new construction and paid for by the issue of an equivalent amount of securities, the operating account would not be affected. On another supposition the item of \$200,000 may represent, not an addition to the plant or assets but a maintenance expense, called for in order to replace worn out equipment or even to make needed repairs. Such an item ought properly to be charged to operating expenses. The original \$600,000 of such outgo ought to have included all such items. But if, instead of being charged to that account, it be entered on the construction account and paid for by the issue of new securities, the operating expenses would be apparently that much smaller. They would then become \$400,000, and the operating ratio would be only forty. By charging operating or maintenance expenses in this way to new construction, the conduct of the property would be made to appear unduly profitable. The same thing would of course occur if, during the time that plant and equipment were new, not subject to heavy repair outlays, no pro-

¹⁴ 50th Cong., 1st sess., Sen. Exec. Doc., No. 51, pp. 53, 65, 101 and 165 discusses the subject of branch line finance. Cf. Greene, *op. cit.*, p. 63.

vision were made for the future when such charges would in due time fall in.

Manipulation of construction accounts seems to have been not uncommon in the past. Its prevalence was one of the strongest arguments for prescription of the form of railroad accounts by law. Such juggling has been associated with most of the roads which at one time or another have figured in court or bankruptcy proceedings. During four years after 1868, Jay Gould while in control of the Erie ran up the construction account from \$49,000,000 to \$108,000,000. The assets remained practically unchanged. A part of this inflation was due to the entry of discount on illegally issued bonds among the assets; but another part undoubtedly arose from charging actual operating expenses to construction account in order to deceive the public as to the condition of the road. Similarly on the old Union Pacific, the operating ratio varied all the way from 23 to 61. From this latter figure in 1870 it declined to 41 in 1879.¹⁵ The U. S. Pacific Commission of 1888 states that the construction accounts of several railways at that time were thus inflated either wilfully or because of the chaotic state of affairs at the time.

An interesting picture of early American practice is afforded by the following excerpt from letters of John M. Forbes with reference to the situation on the so-called River Roads in Wisconsin in 1873.¹⁶ Forbes, representing eastern bondholders, discovered that six of the twelve members of the board of directors, including the president, were also stockholders in a construction company. The following dialogue refers to a contract by the terms of which the construction company was released from any obligation to build after its funds were exhausted, despite the fact that the railroad companies had already paid \$25,000 a mile for fifty-five miles of road which had not yet been constructed.

"Question to the president: 'What have you been doing with the company's money?'

"Answer. 'I have been paying the notes which I have given as president.'

"What are the notes? Where is the record of them? Is it in the treasurer's account?'

"It is not in the company's books, but can be ascertained.'

"What were the notes given for?'

"Answer. 'Chiefly to meet the obligations of two construction companies, of which I was president also, and which built the roads of each company by contract.'

"Then you, as president of the railroad company, are paying yourself as president of the construction company, without the supervision of the treasurer or of any one else, and without any auditing of your accounts?'

"Yes.'

"Has the construction company received the full amount of money, of stocks, of lands, for which they agreed to construct and equip the roads?'

"Yes, they have, leaving unfinished about forty miles of Turkey branch and twelve miles on the lower road.'

The imminence of financial abuse in connection with construction by inter-related corporations is well illustrated by the unhappy experience of the Hampden Railroad in 1913 in Massachusetts.¹⁷ A short connecting link between the Boston & Maine system and the New Haven lines to New York for summer passenger traffic to seashore resorts in northern New England was desired. For this purpose about fifteen miles of road was built out of Springfield, Mass. This work was done for the so-called Hampden Railroad by the Woronoco Construction Company, the Boston & Maine planning to guarantee the interest on the bonds and 5 per cent. on whatever capital stock it was necessary for the Hampden Railroad to issue, in order to finance the enterprise. One Gillette, chosen by the president of the New Haven road,

which then controlled the Boston & Maine, was selected to put through the enterprise. He first organized the Hampden Investment Company, which took the entire capital stock of the railroad corporation of the same name. This concern then negotiated loans upon the deposit of this railroad stock as collateral. The same individual "who was the Hampden Railroad corporation" thereupon entered into an agreement with his own personally conducted construction company to do the work. This concern was to be paid upon the cost plus 10 per cent. commission as profit for its services. No adequate supervision was apparently exercised by the principal railroads, either as to the conduct of the work or its ultimate cost. The construction company immediately sub-let the contracts for building the road for about two-thirds of the price generally agreed upon with the Boston & Maine. Its actual service for profits, sometimes as high as 40 per cent. in addition to its guaranteed 10 per cent., consisted largely of securing the right of way. Obviously under this general arrangement the greater the actual outlay, the greater profit to the construction company. No better premium on reckless expenditure or downright fraud could well have been devised. The final result is significant. Despite the fact that this was a single track line with no equipment and no terminals, the outlay was approximately \$250,000 per mile. The average capitalization for the railways of the United States and the other roads in Massachusetts is about one-fourth that figure. The rental to be saddled upon the Boston & Maine under such conditions would be at least four times the average rental of all its other leased lines, including parts of its main stem.

This extraordinary operation seems to have gone on without any supervision whatever by the then-degenerate management of the consolidated New England railroads under the Mellen régime.¹⁸ Nor did the savings banks or other financial institutions which advanced the necessary funds seem to have exercised due care in the premises. The matter necessarily came before the Massachusetts Public Service Commission in connection with its approval of the necessary issue of securities. By a majority opinion about \$1,000,000 of the alleged actual cost, representing roughly the profits of the construction company, was disallowed. But a capitalization for this insignificant property of \$220,000 per mile was still permitted. As the vigorous dissenting minority opinion stated, this decision, to be sure, reduced the alleged cost per mile by an amount about equal to the total average capitalization of other Massachusetts railroads; but in law, economic principle and public policy it rested upon an utterly untenable basis. It practically legalized fraud upon the stockholders of the Boston & Maine Railroad. Whether it was subsequently to permit a final incidence of the burden of an excessive rental upon the general public, happily still depended upon approval by the commission of the lease of the property upon the agreed basis. The whole episode illustrates the danger incident to interlocking directorates. No person in control of a railroad ought to be allowed to stand in such a relationship that in one capacity it is to his interest that work should be done at the lowest possible price, while in another capacity it will be to his profit to have it performed for a maximum figure. The exercise of good faith, disinterested judgment or prudence is rendered difficult under such conditions.

Recent experience in another case is valuable, as showing the manner in which, even though honestly administered, the finances of a railway and a construction company tend to become almost inextricably entangled. The Atlanta, Birmingham & Atlantic road was projected in 1905 to combine several existing properties and to build a new through line several hundred miles long connecting Birmingham, Ala., Atlanta and the seaboard. Building was done by the

¹⁵ 50th Cong., 1st sess., Sen. Exec. Doc. 51, pp. 53 and 87.

¹⁶ Reprinted in Ripley, *Railway Problems*, rev. ed., p. 85.

¹⁷ 27 I. C. C. Reports, 604; Mass. Public Service Commission, Opinion, Dec. 24, 1913. (P. S. C. 165.)

¹⁸ Similar construction companies seem to have played some part in other trolley operations of the New Haven road, the same individuals who directed the Woronoco Company being apparently in charge. (27 I. C. C. Report, 580.)

Atlantic & Birmingham Construction Company, with a capital stock of \$8,000,000 cash paid in full. It was to receive bonds and stock of the railroad in payment for work done in the usual way. It also controlled coal lands, water and other terminals and various concerns necessary to the operation of the property. The cost evidently greatly exceeded the estimates and the railroad went into the hands of receivers in 1906. About \$30,000,000 seems to have been spent upon the enterprise, a sum about equal to the total funded indebtedness.²⁰ The peculiar feature, differentiating this case from other recent ones, was the interlocking of railroad and construction company finance. Being in straits in 1906, a large issue of collateral trust notes was made jointly by the two companies on the security of their combined properties. Bonds and stocks of coal companies, steamship lines, terminal corporations and the railroad, so far as unpledged, were deposited under this agreement. The result, of course, was that, although the railroad was completed and in operation, the construction company was automatically kept alive as a finance concern during the term of these outstanding joint securities. It could not be dissolved nor could its assets be distributed to stockholders, as is usual under more favorable circumstances. Meanwhile, a maze of financial entanglement obtained, not only in respect of capital account, but of physical operation as well.²¹

A construction company may occasionally, not as in the foregoing instance by force of circumstances, but by deliberate choice, continue in existence long after the railroad is finished, and by holding all or a majority of the railroad stock absolutely control its destinies. Thus the Aroostook Construction Company, organized in 1893, not only still holds the Bangor and Aroostook Railroad in Maine in the hollow of its hand; it also administers the affairs of a number of necessary subsidiary companies, operating telegraphs or holding lands or terminal properties. With a funded debt in 1911 of \$22,495,000, the capital stock of the railroad amounts to only \$3,000,000. This is all owned by the construction company. The stocks of all these inter-related corporations are so apportioned among a very small number of persons that a perfect equilibrium in control is maintained. Still further to insure concentrated and continued control, the construction company is placed in the hands of three voting trustees. The profitableness of this arrangement would seem to arise as much from the fact that all extensions of line are built by this construction company as from its regular dividends upon the shares of the railroad which it owns. Meeting the cost of construction by bond issues, the amount of such shares thus closely held, would seem to be immaterial as affecting the public interest. Market prices many times the par value per share for the construction company stock, would seem to reflect the private advantage of the restricted capitalization of the railroad. The liberal provisions of the Maine law in this regard, the property being entirely intra-state, seem to provide for no supervision as to the nature or amount of the securities which may be put forth. The Southwestern Construction Company is another corporation of the same type serving as a holding company for a highly elaborated nexus of inter-state roads. It serves to bind together a number of properties comprised in the "Queen & Crescent" system in the South.²²

²⁰ The following statement of receipts to 1909 indicates the nature of the operations by which capital was raised:

Share capital, Construction company, cash.....	\$8,000,000
Sales of railroad bonds at 87½.....	3,800,000
Sales of railroad stock, preferred shares at 50, common shares at 15.....	1,000,000
Terminal and coal company bonds, etc.....	8,000,000
Joint collateral trust notes of the railroad and of the construction company.....	7,400,000
Construction company collateral notes.....	800,000
Odds and ends .....	.....
	\$29,600,000

²¹ *Railway Age Gazette*, XLVI, 1909, p. 224.

²² Report on Intercorporate Relationships of Railways, I. C. C., 1906, p. 26.

By way of contrast with the irresponsible, wasteful or fraudulent methods which too often prevailed in connection with the opening up of the West and South, the experience of a sound and conservative company may well be cited. In conformity with the early practice, the nucleus of the great Chicago & North Western system began in 1847 by subscription to the capital stock of a small company. No bonds at first seem to have been contemplated. But it soon became apparent that resort to borrowing must be had. Of the cost, which was \$405,000 of the first 42½ miles of line from Chicago to Elgin, Ill., in 1850, about two-thirds, was raised on share capital, apparently taken at par. Four years later, with 260 miles of line and a total outlay of \$8,300,000, less than \$3,000,000 had been received from sale of bonds. No bonds were issued for less than par until the panic of 1857. The following apologetic explanation from the president of the company at that time is worth quoting:

"The discount on the bonds is simply the amount of interest to be paid, over and above the rate stated, which interest (represented by the discount) is embraced in the face of the bonds, and will be paid at their maturity instead of semi-annually."

The relatively high proportions of capital raised for many years by the issue of stock, instead of resorting to the expedient of borrowing, is indicated by the following figures:

	Capital stock	Bonds	Per cent. bonds
1861.....	\$6,000,000	\$3,500,000	36.8
1871.....	35,800,000	16,200,000	31.1
1880.....	36,500,000	50,100,000	57.8
1885.....	53,000,000	91,500,000	63.3
1896.....	63,700,000	.....	.....
1906.....	122,000,000	156,000,000	56.1
1911.....	152,000,000	163,000,000	51.7

It is apparent that the first fundamental change in policy came in the '70s, probably as a result of the long depression following the panic of 1873. The contrast between capital stock, more than double that of indebtedness in 1872, as against only three-fourths as much in 1880, is striking. Either capital was hard to obtain at home or else the purchase of leased lines through issues of bonds, accounts for this change in policy.

The natural trend of capital of a conservatively financed company back to at least an equivalence between shares and bonds seems to have gone on progressively after the middle of the '80s. The top-notch of indebtedness, relatively, coincides with the speculative period which culminated in the railroad panic of 1884. Since that time, and particularly since 1900, the continued emission of new stock at par, partly in order to raise necessary funds for extension and partly also to furnish a broader base on which to distribute growing surplus earnings, is noteworthy. At least until the problems raised by rate regulation on the one hand and increased operating costs on the other since 1909 assumed their present importance, this conservatively managed property prospered greatly in its affairs. And even under the pressure of adversity, it seems able to bear up bravely, furnishing adequate service without greatly enhanced rates and at the same time to continue a satisfactory rate of return to its shareholders. Scanning thus the history of this company, one seeks in vain for construction companies or other subsidiary corporations existing for the profit of insiders in the management. With high credit based upon a consistently honorable record, high commissions to underwriting syndicates operating in connection with the provision of new capital, have been unnecessary. And, as we shall see, the corporate structure of the system is simple. A large proportion of its plant is owned outright. There are no conflicts of interest between the company and the rights of minority shareholders in lines controlled by lease or through stock ownership. Its accounts are in consequence simple and intelligible. Such an achievement is a credit to all concerned whether in operation or finance. The Great Northern is another conspicuous example of the same sort. And there is little ques-

tion that the type is more common than the numerous pathological examples in our text would lead one to suppose. But only by the study of disease can the laws of health be determined. The same principle holds good in corporate finance.

TRAINING TELEGRAPHERS*

By J. B. SHELDON

Superintendent of Telegraph of the Union Pacific

Beginners in this line of work should start when fairly young, preferably from 16 to 18 years of age, after securing a good common school education, as they can then learn more readily than when older and, until they qualify as operators, they are better satisfied with the small wages allowed them as helpers, than in the case of older students whose needs are likely to be greater. They should be bright and industrious, they should have an earnest desire to make a success of the work, their habits should be good, they should be courteous and it is essential that they should be qualified to pass a rigid physical examination, especially with respect to eyesight and hearing. Telegraph schools should be maintained to prepare at least partly those who desire to enter the service.

If the demand for station helpers on railroads were quite uniform the year round, the railroads could no doubt operate schools for providing telegraph help for their own stations to very good advantage; but, as the calls for such help are very uncertain and fluctuating, it is probable that better general results can be had by encouraging and patronizing reliable schools outside on account of the larger field for selection that is afforded.

In railroad telegraph schools only such applicants should be accepted as appear to be reasonably well fitted for development in the service, and those not making progress should be dropped. The success of the telegraph school depends much more upon the quality of the graduates than upon the number of students graduated.

In outside telegraph schools, it seems to take the average student about four months to complete the course, which, besides contemplating a school proficiency in telegraphing to the extent of from 18 to 20 words a minute, usually embraces a brief course in arithmetic, spelling, typewriting and practice in penmanship. The last mentioned is a very important qualification, in which we find most of the students, as well as graduates, are extremely deficient. All schools should require more penmanship practice and not permit their students to graduate until they are able to write in a good plain manner. The railroads should encourage the outside schools by arranging for wire connections as far as conditions will permit.

After graduating from outside schools, students are usually far from qualified to be of real assistance as helpers at stations, much less to be used as operators; and a finishing course under railroad direction is desirable to fit them for positions as station helpers. A railroad finishing school should have despatcher, railroad message and commercial telegraph wire connections, to enable the students to keep up their telegraph practice, say three hours a day. The finishing course, which is intended to cover a period of approximately a month, should treat more of the essential duties that are usually required of helpers, such as:

- Sealing cars and making seal reports;
- Checking cars in yard and making car reports;
- Making bills-of-lading, freight bills and way-bills;
- Copying way-bills and daily reports;
- Making abstracts of freight received and forwarded;
- Western Union rules, rates and reports;
- Sale of local tickets and making ticket reports;
- Checking baggage and figuring excess and storage charges;

*A paper read before the Association of Railway Telegraph Superintendents at New Orleans, May 19; abridged.

Express rates and billing and reporting express;
Filing freight and passenger tariffs;

Use of *Official Guide*, time table folders, etc.

In addition, general instruction may be given in regard to switchboards, wire testing and patching, instruments, batteries and the use of telephone train despatching equipment.

This railroad school preparation is largely for the benefit of the railroad, so that no tuition or other expense in connection therewith should be charged the students. Without the railroad school, most of the instruction outlined above would be left for agents to give upon the arrival of the new helpers at their stations; but agents are usually too busy.

The cost of this railroad finishing school instruction, where a fair number of students is provided for, averages only about \$10 per student, which is small for the benefits derived. Before students are taken into the railroad finishing school, they should pass the prescribed physical examination, so there may be no question as to their qualifications in this respect.

After putting the students through the finishing school and assigning them to helpers' positions at stations on the road, they must still be supervised, to see that they have some opportunity to practice telegraphy and that they are promoted to operators' positions as soon as conditions will permit after they are considered to be fully qualified and have passed an examination to show their ability. Helper positions should pay enough so that the students assigned to them can pay their board and properly maintain themselves, in an economical manner, until they are promoted to operators' positions. It is desirable to have helpers' positions at different rates of pay and to promote the helpers to better paying positions from time to time, as conditions will permit, so as to keep them better satisfied and to compensate them more and more as they become of greater value.

It seems to take, on an average, about a year for the students to secure telegraph positions, after beginning to work for the road as helpers. They frequently become discouraged, with this seemingly long wait, especially, as is often the case, if they were led to believe when entering an outside telegraph school that operators' positions awaited them immediately upon graduation, and much encouragement and patience from agents is usually required to keep them in their positions until they finally achieve their ambition and become actual operators.

In some states laws have been enacted that have interfered very much with the promotion of qualified students to operators' positions. In one state, a law was passed preventing the use in night operators' positions of operators under twenty-one years of age. This has been a great discouragement to students, as most helpers cannot afford to wait, with small rates of pay, until they reach the prescribed age, when in other lines of work they can do better. We have endeavored to secure a modification of this clearly unjust law, so as to permit the use of operators 18 years or more of age in night positions; but so far without success. In another state there is an unqualified law against the employment of operators who have not had experience as such for a year or more. This is so clearly unreasonable and impracticable in its general application, that it would entirely prevent additions to the supply of operators, and it ought not to exist.

About one-third of the operators now employed on this road are of our own training; they understand our road, its methods and business much better than could be expected for a long time from those trained elsewhere.

Correspondence school courses may be provided for those who wish to receive instruction and to progress in certain lines of railroad work; but, ordinarily, there is hardly enough demand on any one railroad, for any particular line of instruction, to warrant the expense of providing such courses. Generally such courses, on nearly all pertinent subjects, can be arranged for by the employees themselves with schools that are prepared to supply operators to any road, to a better advantage than for the separate roads to provide their own courses.

New St. Paul Tunnel Through Cascade Mountains

This Road Is Driving a Bore 12,000 Ft. Long Through
Summit of Snoqualmie Pass Lowering Summit 443 Ft.

The Chicago, Milwaukee & St. Paul is now driving a tunnel 11,902 ft. long through the summit of the Cascade mountains between Rockdale, Wash., and Keechelus, 60 miles east of Seattle, which will effect a saving in distance of over 3.6 miles, and will eliminate 443 ft. of rise and fall and 1,239 deg. of curvature. This tunnel is being driven by the European or bottom heading method and is being handled entirely by company forces, making this work of special interest from the construction standpoint.

When the coast extension of the St. Paul was built in 1908 that portion of the line between Rockdale and Keechelus was built over the summit to expedite the completion of the road with the expectation that the tunnel would be constructed as soon as traffic conditions warranted. Work was started on this project in 1912, but was not prosecuted vigor-

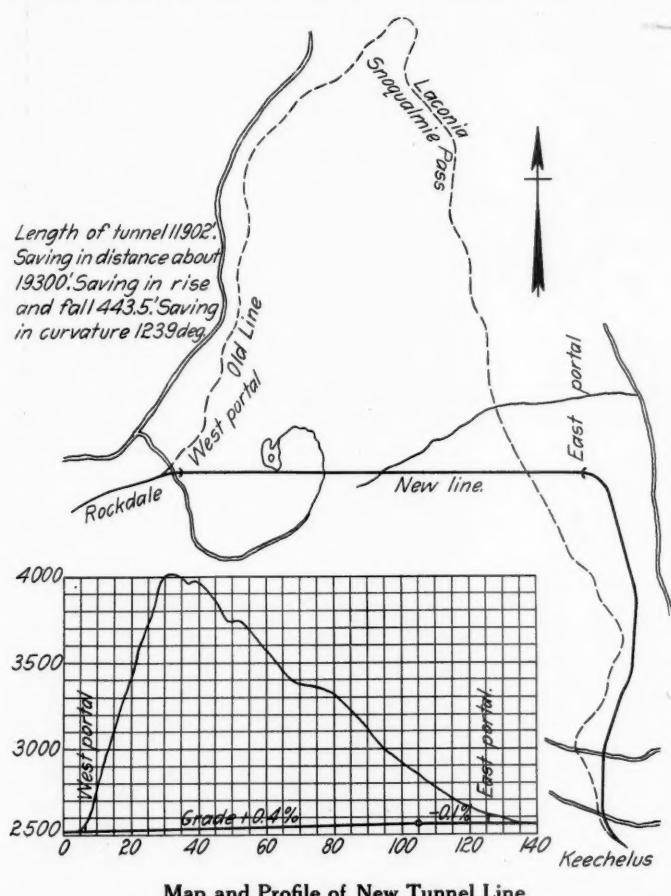
is put on at Keechelus. With the construction of the tunnel westbound trains will cross the summit without any helper service, while eastbound only one helper will be required for 19 miles.

In addition to the reduction of helper service the elimination of snow troubles is also an important consideration. During the winter of 1912-13, in common with the other roads in this vicinity, the St. Paul suffered severely from snow blockades, and the line was closed at different times for a total of ten days. The construction of this tunnel will eliminate 95 per cent. of the trouble with snow in the Cascade mountains and in this way will render unnecessary the construction of extensive snow sheds which would otherwise be required.

The tunnel is being built for single track on a grade of 0.1 per cent. ascending from the east end for 2,000 ft. and then descending on a 0.4 per cent. grade to the west portal. It is on tangent for the entire length with a 6 deg. curve at the east end and a short 3 deg. curve at the west portal. The new line crosses under the old about 1,600 ft. in from the east portal. After emerging from the tunnel it turns parallel to the old line and connects with it at Keechelus two miles south of the east portal.

METHOD OF CONSTRUCTION

Before deciding upon the method to be adopted in driving this tunnel the relative advantages of the top heading method



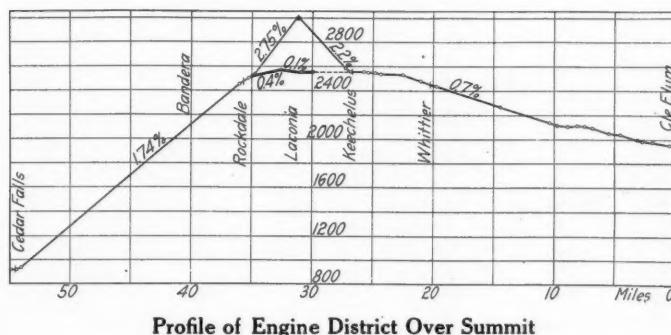
Map and Profile of New Tunnel Line

ously until the spring of 1913, when the snow troubles encountered the preceding winter showed the advisability of completing the tunnel as soon as possible.

The ruling grade westbound on the engine district from Cle Elum to Tacoma and Seattle is 0.7 per cent. to Keechelus and 2.2 per cent. from that point to the summit at Laconia, 4.74 miles. Eastbound the maximum grade is 0.8 per cent. to Cedar Falls, 1.75 per cent. from Cedar Falls to Rockdale, a distance of 19 miles, and 2.75 per cent. from Rockdale to Laconia, 4.37 miles. The traffic consists of three passenger trains and an average of four tonnage freight trains each way daily. The direction of heavy tonnage is eastbound. One Mallet locomotive now brings 2,100 tons to Cedar Falls, where a Mallet helper is put on. At Rockdale a second helper is required as far as Laconia. Westbound one helper

generally employed in this country and of the bottom heading, or European, method were studied. After careful consideration of the material to be expected, the bottom heading method was adopted as most economical because of the ability to trap the material above the first drift directly into cars, whereas the removal of a lower bench by large shovels or other power equipment was difficult if not impractical in a tunnel of this length. An advance heading 8 ft. by 13 ft. is first driven on subgrade at one side. A second crew then follows, breaking this heading out to the full width of 18 ft. This is timbered with 12 in. by 12 in. posts capped by 12 in. by 14 in. timbers at intervals of 5 ft. Following the timber vertical openings are driven to the arch ring of the completed tunnel at intervals of 150 ft., and the excavation is pushed from these openings in each direction, drilling and blasting the entire face. The material is broken down on to the timbering and is trapped into narrow gage cars on the lower level.

In driving the heading four Ingersoll-Rand, 3 1/2 in. piston type air drills, weighing 410 lb. each, are mounted on one cross bar and are operated simultaneously. This cross bar is set up about 4 ft. above subgrade. When working in ordinary rock 16 holes are drilled to a depth of 8.5 ft., 12 of which are



Profile of Engine District Over Summit

above the cross bar with four lifting shots beneath. Ordinarily the holes are not sprung, although in some instances when working in unusually hard rock it has been necessary to spring the holes twice. From $3\frac{1}{2}$ to 9 boxes of 60 per cent. powder is set off in each set of 16 holes and is fired entirely with fuses. The average horizontal break is 7.3 ft. and the material generally is broken so that it can be handled readily. With the material encountered so far about 8 lb. of powder are required for each cubic yard of material shot from the heading.

The floor of the heading is covered with steel plates which are moved forward before each shot so that the material will fall upon them and be more readily loaded. In the lower heading and side drift a steel rocker car of one cubic yard capacity is used. This car is 3 ft. high and 4 ft. wide and was designed to operate in limited space. Peteler $1\frac{1}{2}$ yd. side dump cars are employed for the removal of the material trapped down from the bench. Two tracks are laid with 56 lb. rail to the face of the heading, with frequent cross-overs. Horses haul the cars as far as the outer face of the bench, from which point they are handled with gasoline locomotives. All material from the tunnel is wasted at the portals.

When working in average material one round is shot every 12 hours in the heading. This time is divided approximately as follows:

Three hours taking down roof and removing muck from the face of the heading.

Thirty minutes setting up the cross bar and getting the drills into position.

Seven hours drilling and removing the muck.

Thirty minutes taking down machines and loading and firing shots.

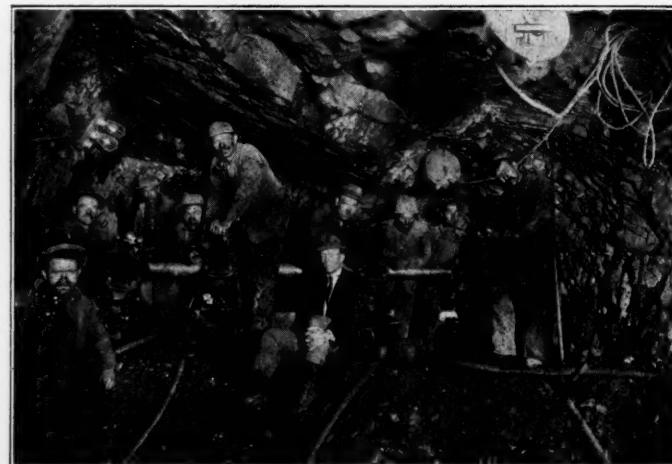
One hour clearing heading of smoke and gas.

To accomplish this a force is employed on each shift con-

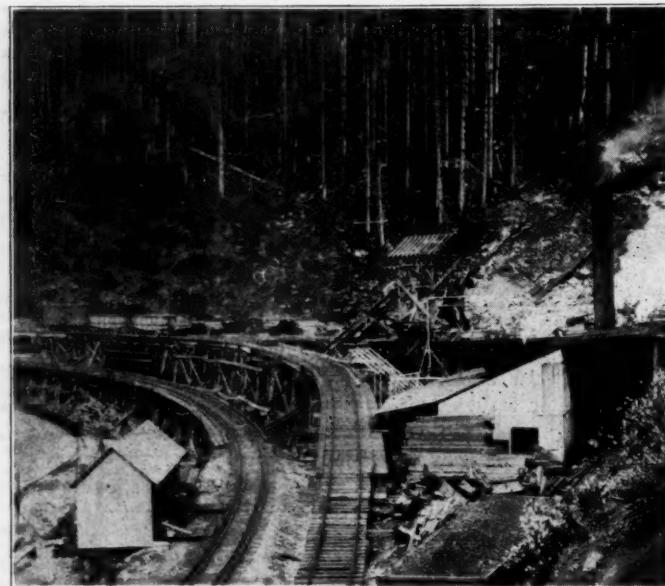
tinued. With this considerable water was also found. The first 400 ft. in on the west end was a debris formation which also carried considerable water. However, between these two places sections as long as 1,500 ft. were found with no water whatever. Because of the hard character of the material on the west end it was necessary to replace the drills weighing 175 lb. with heavier ones weighing 410 lb., although on the east end new Ingersoll-Rand drills weighing only 110 lb., with a new valve motion, and striking 600 blows per minute, are being tried out.

At the east end the work is being handled differently because of a large approach cut. To save time a heading is being driven at the upper level which will be continued to a junction with the bore from the west end. After the approach cut was completed, a second heading was driven at the track level, with shafts at various points extending to the upper heading to facilitate the handling of muck from the bench.

To provide ventilation and to remove the powder gases



Working at the Heading, Showing Drill Cross-arm



View at West Portal, Showing Present Main Line at Left and Concrete Plant in Center

sisting of four drill runners, four helpers, ten muckers, one npper and one shift boss.

From six to ten bench openings are worked at one time, giving double that number of working faces. In this way the drill runners move from one face to another and work continuously, while on the heading they assist in throwing the material away from the face to expedite the work.

In general, the material encountered has been hard black slate. However, about 5,000 ft. in from the west end a hard conglomerate with a large proportion of silica was encoun-

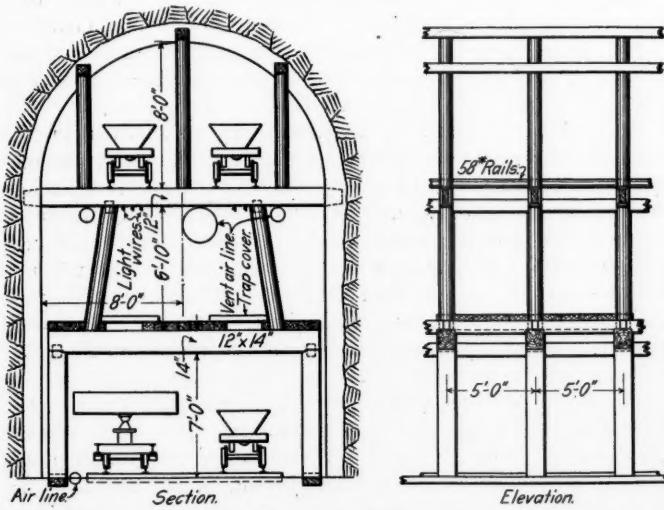
from the headings promptly one 12 in. ventilating pipe extends from the power house at the west portal to the face of the heading. Air is forced through this line by a high-speed fan with a capacity of 4,500 cu. ft. of free air per minute, direct-connected to a 25 h. p. steam turbine. A high-speed helper fan, with a capacity of 4,500 cu. ft. of free air per minute, direct-connected to a 20 h. p. electric motor, is located 2,500 ft. in from the west portal. To remove the dead air a 24 in. pipe line leads out from the bench. This is connected to a 72 in. slow speed exhaust fan driven by a 30 h. p. motor. As the bore is driven further in additional ventilation will be provided by adding more helper fans on both the exhaust and blower lines. A similar system is in use at the east end, the only important differences being that the exhaust fan is direct-connected to a 40 h. p. steam engine and the blower line is 17 in. in diameter, instead of 12 in., at the west end.

CONCRETE LINING

It is planned to line the tunnel with concrete for its entire length before it is turned over to operation. This work has been under way at the west end since July, 1913, excepting the months of December, 1913, and January and February, 1914, the best progress being made in November, when 1,100 ft. of tunnel was lined. Lining is now being begun at the east end. It is anticipated that forces working from the two ends will meet about 8,000 ft. in from the west portal, and methods for transporting the material are being figured on that basis. All concrete is mixed at the portals and is hauled in trains of 4 steel cars of 18 cu. ft. capacity each. These cars are moved by a $\frac{3}{4}$ in. cable operated at a speed of four miles per hour. Each car is equipped with a cable gripping

device which is automatically released at the proper point by a trip.

Bank run gravel sluiced directly into cars 15 miles west of Rockdale is used for concrete. These cars are placed on the elevated trestle shown in the accompanying photograph and are dumped directly into storage bins below. The gravel and cement are then hoisted in skip cars to a point above the mixer, and are dumped through a hopper into the mixer. This mixer discharges directly into the steel cars referred to above, which are hauled into the tunnel on a track laid at the elevation of the springing line of the arch and supported on 8 in. by 12 in. timbers, as shown in one of the sketches. The concrete is dumped directly into the side walls and is placed by hand in the arch ring. The side walls are built in sections 50 ft. to 100 ft. long. Movable timber forms 12 ft.



Cross Section of Tunnel, Showing Timbering and Arrangement of Ventilating Lines

in length are used in constructing the arch and one section is concreted completely at a time.

For the first 450 ft. the timbering was concreted in place. Beyond this point it is being removed ahead of the concrete, with the exception of the horizontal 8 in. by 12 in. timbers, which are being concreted in and later sawed off. Grout is also being forced in by pneumatic pressure to thoroughly fill all the voids between the surface of the rock and the concrete lining, especially over the arch. By the construction of a separate track at this elevation for handling concrete it is not only possible to dump it directly in the side forms, but all interference with mucking operations on the track below is eliminated.

At the east portal a spur track has been constructed along the main line with bunkers beneath for gravel. A 36 in. gage double track line has been constructed between these bunkers and other bunkers directly over the portal of the tunnel, and gravel is transported from this track in 2 cu. yd. cars, the loaded car descending pulling the empty one up. The remainder of the concrete plant is a duplicate of that at the west end, with the exception that electric locomotives will replace the cable haulage.

POWER PLANT

The power plant at the west end consists of three oil-burning, 150 h. p. boilers, which operate two straight-line, single-stage Ingersoll-Rand air compressors, with a capacity of 807 cu. ft. of free air per minute each, and one straight-line, two-stage Ingersoll-Rand air compressor with a capacity of 790 cu. ft. of free air per minute. These boilers also provide steam for a 200 h. p. engine belt-connected to a 100 kw, 500-volt d. c. generator, furnishing power for the motors operating the fans and for the Leyner drill sharpeners and other tools in the shops. This generator also supplies current for

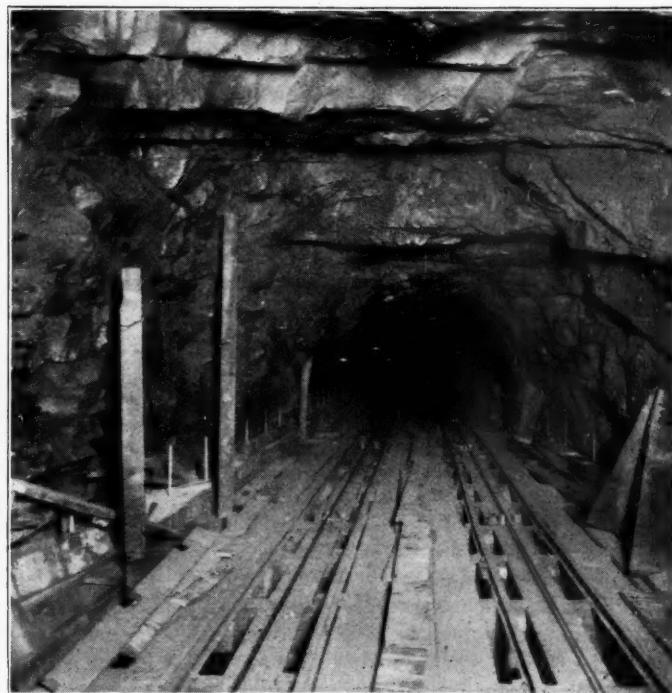
lighting the tunnel, using a three-wire system of distribution, which allows a voltage of 250 to be used. A 3 kw. balancing set is installed in this circuit. Extension cords are provided at the various faces where blasting is being done.

At the east end three 125 h. p. boilers are installed. These boilers also operate on fuel oil, which is delivered from the main line one-half mile distant into two 20,000 gal. timber oil sumps and is then carried through a 6 in. wood stave pipe line to a 35-barrel service tank at the power station. These boilers operate two Laidlaw-Dunn-Gordon duplex two-stage air compressors with a capacity of 1,030 cu. ft. of free air per minute each, and one 180 h. p. engine direct-connected to a 75 kw., 500 volt, d. c. generator. The lighting system here is practically the same as that at the west end.

Telegraph and signal wires will be carried in two 3 in. fibre pipe lines placed in the side walls 7 ft. above grade. Terminal boxes for these conduits are provided in the refuge niches placed at intervals of 300 ft. Because of the amount of water encountered it has not been finally decided whether a concrete gutter or tile drains will be installed for drainage.

The construction of this tunnel is being handled entirely by company forces. With the exception of the shift bosses, who work 12 hours, the work is carried on continuously in three shifts, six hours on and 12 hours off. The concreting force is divided between two shifts of 10 hours each. Normally, about 250 men are employed in the tunneling operation in each end, and 80 men are engaged in placing the concrete lining at the west end.

The men engaged in driving the heading are paid a bonus



View of Interior of Bore

based on 10-day periods. For each foot of heading driven over 100 ft. in this period each man is paid one hour overtime. This practice has been found to work out very satisfactorily, as it tends to expedite work and to hold the men as well. Under favorable conditions the men have made as much as 60 hours overtime in 10 days. The best progress made in the west heading for one month to date was 450 ft. and on the west bench 600 ft. Among other measures taken to safeguard the men, a pulmotor with several oxygen helmets is provided at each portal.

The approach cut at the east portal, requiring the removal of 42,000 cu. yd. of material, is also being handled by company forces. The remainder of the line change, requiring the re-

removal of 125,000 cu. yd. of material, 85 per cent. of which is solid rock, is being done by contract by Henry & McFee, of Seattle. The grading on the approach cut has been completed. The heading at the west end of the tunnel is now in about 6,500 ft., while that at the east end is in about 3,500 ft. At the present rate of progress these headings should be connected about July 15, and the tunnel should be completed, including the concrete lining, by the end of year. About 3,100 lineal ft. of concrete lining have been placed to date, comprising about 18,500 cu. yd.

This work is being done under the direction of C. F. Loweth, chief engineer, and E. O. Reeder, assistant chief engineer. J. I. Horrocks is engineer and superintendent of construction in direct charge of the work on the ground.

INTERNATIONAL RAILWAY FUEL ASSOCIATION

A report of the Monday, Tuesday and Wednesday sessions of this convention appeared in last week's issue. Business transacted at the closing session on Thursday, May 21, was as follows:

ECONOMIES IN ROUNHOUSE AND TERMINAL FUEL CONSUMPTION

F. W. Foltz, fuel supervisor of the Missouri Pacific, read a paper on this subject of which the following is an abstract:

Investigation develops that from 15 to 25 per cent. of the total coal used by locomotives is consumed in roundhouses and at terminals, while not actually performing service. The high percentage of terminal consumption on some roads can be partly attributed to lack of facilities in the way of roundhouses, cinder pits, coal chutes, track room, etc., and this feature should be brought forcibly before our managements with a view of securing needed facilities as quickly as possible. The highest degree of economy at terminals, as well as on the road, can only be attained by the closest co-operation of the heads of the transportation and mechanical departments, engine crews, hostlers and roundhouse forces.

A vast saving in coal can be effected by proper attention to cleaning fires and in having the fire in proper condition on arrival at the terminal. Locomotives should receive immediate attention on arrival and not be allowed to stand around for hours before the fires are cleaned, consuming approximately 150 lb. of coal per hour in large power.

Too great care cannot be given at terminals to the proper cleaning of flue sheets and flues. This applies more especially to superheater engines. In many cases I have found clinker built out on the end of a superheater unit some 6 and 7 in. This, of course, seriously interferes with the steaming capacity of the engine, resulting in a loss of fuel. Roundhouse foremen should give this work particular attention, instructing the men and providing proper tools to work with, and I would suggest that a cent or two more an hour be paid for this work as incentive for better service.

The proper washing and cleaning of boilers at terminals is one of the greatest factors in fuel economy. At this time I am unable to say the exact amount of fuel wasted by scaling of boilers, but we know that it is something enormous. Material saving can be made in firing up locomotives at terminals. I have found at many terminals where they were bedding down grates, using ninety scoops of coal (where shavings were used to start fire), but after carefully instructing the fire-builder and following it up to see that our instructions were carried out, we were able to get the same results from forty to fifty scoops of coal. In preparing the fire for service the blower should be used gently so that the fire will burn slowly and the rise of steam pressure will not be too rapid. The sudden expansion of sheets and tubes is harmful.

It is a practice on many roads to start fires in engines when the mechanical work is finished. In checking up one of our large terminals (before the fuel department was organized) I found sixty engines a day were fired up on an average of six

hours and thirty minutes before departing. Irregularities of this nature have been overcome by the co-operation of the roundhouse and transportation forces. In order that the amount of time locomotives are kept under steam, when not performing service, may be reduced to the minimum, a daily report from each terminal will be found of great value.

It is also desirable to charge each terminal with the amount of coal consumed by locomotives from the time they are turned over to the hostlers until they are again placed in charge of the road crews. This coal should be deducted from the total used by the locomotive, enabling you to make a separate performance sheet of terminal and road consumption. A comparison can then be made of the performance of the different terminals, and the weak ones given special attention until the cause for the poor showing is developed and corrected.

The coal consumed by stationary boilers is also a feature that has received very little attention on most roads. The inexperienced, cheap laborer usually employed to heave the coal into the firebox of the stationary boiler is one of the most expensive small units in a railroad organization.

An effort should be made to employ men of sufficient intelligence to be taught the correct method of firing, and some one who knows should be delegated to instruct the stationary boiler fireman, having the new man serve an apprenticeship the same as any other position requiring skilled labor. After your stationary plants are equipped with competent firemen, you will not only notice a decrease in the amount of fuel used, but will probably find that you can get satisfactory results out of a lower and cheaper grade of coal, saving all the way from 20 to 30 per cent. in the price at the mines.

Discussion.—Several members laid particular stress on the opportunities for wasting fuel at terminals; tests have shown that from 20 to 35 per cent. of all the fuel used on locomotives is used at terminals, and that the absolute waste in fuel is as high as 50 per cent. As high as 35 to 50 per cent. fixed carbon is thrown away in the ashes at the cinder pit. Considerable was said concerning economy at stationary plants. It was believed that if more intelligent firemen were used in this work large savings could be made. Mr. Collett, formerly with the Frisco, showed how a good deal of the fuel used at terminals was saved by doubling the length of trips of the locomotives. In closing his paper Mr. Foltz stated that on four heavy runs between Kansas City and St. Louis that road had saved \$1,000 per month by running the engines through.

CLOSING EXERCISES

M. D. Franey, master mechanic, Lake Shore & Michigan Southern, commented on the new smoke washing plant at the Englewood roundhouse, and the success which had attended its installation.

J. G. Crawford reported for the committee on fuel tests that very little information could be obtained on road tests of fuel and suggested that the roads endeavor to obtain all the information possible as to the efficiency of the different grades of coal, methods of firing, etc.

The following officers were elected for the ensuing year: President—D. R. MacBain, superintendent motive power, Lake Shore & Michigan Southern; vice-presidents—D. C. Buell, Union Pacific; J. G. Crawford, Chicago, Burlington & Quincy, and B. P. Phillippe, Pennsylvania Railroad; executive committee—E. W. Pratt, Chicago & North Western; C. M. Butler, Atlantic Coast Line; W. L. Robinson, Baltimore & Ohio; T. J. Lowe, Canadian Northern, and R. R. Hibben, Missouri, Kansas & Texas.

URUGUAY ADOPTS THE TWENTY-FOUR HOUR DAY.—A recent executive decree provides that in all public offices of Uruguay the 24 hours shall be counted from 0 to 24, and that this system shall be adopted in all official acts, time-tables and the like. By a subsequent decree the new time reckoning is made applicable to the national telegraphic service.

Master Boiler Makers' Annual Convention

Locomotive Boiler Inspection Touched Upon in Address es By Ivy L. Lee, S. G. Thomson and Frank McManamy

The eighth annual convention of the Master Boiler Makers' Association was held at the Hotel Walton in Philadelphia, May 25-28. The first session was called to order at 2:30 p. m. on Monday, May 25, by the president T. W. Lowe, general boiler inspector of the Canadian Pacific, and was devoted to addresses by Rudolph Blankenburg, mayor of Philadelphia; S. M. Vauclain, general manager of the Baldwin Locomotive Works; Ivy L. Lee, chief executive assistant to the president of the Pennsylvania Railroad, and by the president of the association.

MR. VAUCLAIN'S ADDRESS

Mr. Vauclain called attention to the fact that it is the care and maintenance of a boiler that exacts the greatest amount of attention and skill. It is a comparatively simple matter for a builder to construct a boiler in accordance with designs that have been prepared, and if he is honest and wishes to turn out good and reliable work it can be done; for the men in a shop are apt to be infused with the spirit of the employer. He insisted that the best of men were required for repairs and called attention to the difficulty of getting them. Young men do not take kindly to the boiler shop, but, in his opinion, that department is one of the most, if not the most important of the works. For that reason he advises all of his apprentices to spend a part, at least, of their apprenticeship in the boiler shop, because skill in that line promises better for promotion than any other. He considered that the work on the boiler required more skill than any other part of the locomotive, because of the nature of the material that is used and the necessity of being familiar with its every aspect, such as its flanging and bending qualities, in order that it may be rolled and bent into shape without injury. It also requires a high degree of technical skill in order that the foreman in the shop may be able to check and detect any inaccuracies that may be made in the drawings, for inaccuracies will creep in in spite of everything that may be done. It is this knowledge and technical skill on the part of the boiler maker that is necessary to avoid disaster both in the building and the repair shops.

It might be thought that the building of boilers was one long piece of routine work, but it is nothing of the sort. Each boiler presents new and individual problems that only the practical and skilled man in charge can solve, so that it is safe to say that the greatest amount of skill is required in order to become a successful boiler maker.

In replying to Mr. Vauclain, C. P. Patrick called attention to the great lack of boiler maker apprentices and urged the recruiting of their ranks in order that there might be a supply for the future. He also spoke of the work of the federal boiler inspectors and said that, when the law was first put in action, he regarded many of its provisions as unnecessary and as putting a hardship on the railroads. But after an experience with it of three years he had come to the conclusion that it was a good thing and had found that when a road was willing to meet the inspectors and show that it was endeavoring to do its best and keep its boilers in a good state of repair no difficulty was encountered.

IVY L. LEE'S ADDRESS

Mr. Lee spoke on the safety first question and said that it warrants a certain amount of money being spent in order that economical results might be obtained. There is a limit, however, beyond which it will not be worth while to spend money, as the results that can be obtained will not be commensurate with the cost. It is sometimes far better to turn to the improvement of the men than to the improvement of

the physical features of the road. In other words it is well to turn attention to man failures. In England, where human life is placed on probably a higher value than in any other country of the world, and where their cars are little better than wooden bandboxes, there has been no indication of a movement towards the compulsory use of the steel car, because they think more of discipline than they do of such helps to minimize the effects of an accident. We have gone further. There is a movement on foot to legislate expenses upon railroads that they cannot properly bear. The carelessness of automobile drivers, for example, causes one long continuous series of accidents at grade crossings, a series of accidents that spell carelessness on the part of the drivers of those machines and which would never happen if they would use ordinary care. Yet the state of New Jersey has enacted a law for the abolishing of grade crossings that puts the whole burden on the railroads. Yet to abolish the grade crossings in New Jersey on the Pennsylvania Railroad alone, would cost about \$60,000,000. To abolish all the grade crossings on the whole Pennsylvania system would cost about \$600,000,000 and to do the same for all of the crossings in the country would cost about \$5,000,000,000. So that the cost of such provisions for safety becomes simply stupendous, while it could all be avoided by the exercise of common carefulness.

The same statement holds in the matter of trespassers. Here, again, it is simply a case of carelessness. Trespassers are killed and it is man or woman carelessness.

The Pennsylvania Railroad has spent immense sums for the promotion and securing of safety, but it must be evident that there are limits beyond which it will not pay to carry the expenditures. It is far better to cultivate the spirit of carefulness. Take the matter of the automatic stop, for instance. Suppose such a stop were available and could be used. It would simply be transferring the responsibility from the man on the engine who has the interest of his own life to make him careful, to the shoulders of another who has no such interest. Again the self-cleaning ashpan that has been required by law. It has cost the Pennsylvania Railroad alone about \$600,000, and all of this is an absolute waste and would not have been needed, if the men would only be careful.

In the matter of boiler construction the Interstate Commerce Commission contemplates the establishment of an arbitrary factor of safety. If this is done we will be the only country in the world where such a rule exists for other than state railroad. Such a rule, if made calling for a factor of safety of 5, would not add materially to the exemption of locomotive boilers from explosion. Out of the 63,000 locomotive boilers in use in this country there have been but six shell explosions in two years, making an average of one shell explosion for each 21,000 boilers per annum, and this on a factor of safety of about $3\frac{1}{4}$. While on the Pennsylvania Railroad there has not been a single shell explosion since 1880. The whole question of boiler safety sifts itself down to one of carefulness and maintenance. Take the reports of the Travelers Boiler Insurance Co. Out of all of the money collected for insurance 25 per cent. was spent in securing business; 50 per cent. for inspection; 10 per cent. for business expenses; 5 per cent. for profit and 10 per cent. for loss. So that out of all the money paid for steam boiler insurance, 90 per cent. was unnecessary, and could have been saved by carefulness.

In short it is a question of men. It points to the necessity of taking young men and training them so that they will appreciate the necessity of being careful; of showing them

that pure mechanical and mathematical formulae are not altogether reliable and dependable, but that back of their use there is need of experience and care, and this training is of the first importance if satisfactory results are to be obtained. The perfection of the man as well as of the machine is what we must work for.

TUESDAY'S PROCEEDINGS

The morning session on Tuesday was opened with addresses by S. G. Thomson, superintendent motive power of the Philadelphia & Reading, and Frank McManamy, chief of the boiler inspection department of the Interstate Commerce Commission.

MR. THOMSON'S ADDRESS

Mr. Thomson especially emphasized the value of and the assistance to be derived from the federal boiler inspectors. These men are all experienced and their duties, in taking them from one road to another, give them opportunities for observation that do not come to the average boilermaker. They are, therefore, possessed of a mass of information that they are quite ready to impart and which the members should take every opportunity to acquire. It behoves every boilermaker in the country to welcome these men to their shops and learn what they can from them. There can be no quarrel with the boiler inspection law if an attempt is made to comply with its provisions and get all out of it that is possible.

He also touched on the difficulty of getting good men to do the work and the scarcity of apprentices in the boiler shop. It is hard and noisy work and needs ample compensation, both physical and mental. The former must come through the wages received and the latter from the satisfaction of work well done.

MR. M'MANAMY'S ADDRESS

Mr. McManamy took exception to a statement that had been made by Mr. Lee to the effect that it was possible to spend too much money for the prevention of accidents, and insisted that resources could not be wasted in an attempt to secure greater safety. While many accidents might be due to man failure, and all boiler failures might be attributed to that cause, yet, if that were the case, then the application of the boiler inspection law had succeeded in reducing man failures by about 60 per cent. in the fatalities due to boiler accidents in comparison with what had occurred before the law became effective. Thus for the first year of its operation and for the following nine months for which reports are available the reduction has been 48 per cent. If the application of the law has been responsible for the elimination of a single accident that caused a loss of life, it is well worth while.

All that the federal boiler inspectors ask is co-operation on the part of the boilermakers and others who are responsible for the operation of boilers on railroads. It must be remembered that the government does not supply the inspectors that are to do the everyday work of inspection. That is done by the employees of the railroads, who thus become the real government inspectors.

As for the factor of safety, the roads have been working under a factor of safety of 4 for some time, and the manner in which it is proposed to enforce a strict compliance with this factor will bring no hardship to any one. In the early inspection of boilers, it was found that there was a large number of them that had a very low factor. In fact, some were found whose factor was below two, and surely no boilermaker would advocate running a boiler in that condition. While there may be some difference of opinion as to what might be the best factor to employ, no one would hazard the opinion that 2 was correct to use. In the early inspection referred to it was found that there were:

212 boilers whose factor of safety was less than $2\frac{1}{2}$
1,224 boilers whose factor of safety was less than 3
2,371 boilers whose factor of safety was less than $3\frac{1}{4}$
4,524 boilers whose factor of safety was less than $3\frac{1}{2}$
7,254 boilers whose factor of safety was less than $3\frac{3}{4}$
12,043 boilers whose factor of safety was less than 4

A factor of safety of 4 is not too high and the reason for fixing it at that is that it is one to which builders have been working for a number of years. Nor will it be any hardship to comply with the provisions of the rulings, for the railroads will have

seven years in which to bring their boilers up to the standard. No road can possibly be tied up because of it. As it stands the regulation gives all roads up to January 1, 1915, to bring their boilers up to a point where the lowest factor of safety will be 3; until January 1, 1916, to bring them up to a factor of safety of $3\frac{1}{3}$; until January 1, 1917, to bring them to $3\frac{1}{2}$; until January 1, 1919, to bring them to $3\frac{3}{4}$, and until January 1, 1921, to bring them up to 4. That is a fair sample of the manner in which the department is attempting to co-operate with the railroads.

It is quite natural for men to resist the application of rules of regulation whether they be good or bad, even though those regulations really make no difference in their conduct. But it has been found that no big interest serves the public to the best advantage when it is uncontrolled.

Of late we have heard a great deal about the safety first movement. It is nothing new, for it started about 22 years ago, when it was enacted that the railroads should equip their cars with automatic couplers and air brakes. At that time some roads were using these appliances of their own accord, but it was necessary that legislation should step in to compel those who were not inclined to introduce these now necessary parts of the equipment, to do so. Surely no one now thinks that the compulsory use of these things is a hardship, nor would any railroad man think that it would be possible to run his road without them.

In the same manner there will be no hardship in the enforcement of the regulation regarding the factor of safety. The railroads are not to be asked to make changes in a day that will require time, and boilers will be allowed to run until they are sent to the shop for the application of the firebox and wrapper sheet. So, too, it will be found that these rules are not new but merely the application of old rules that are already fixed and in use. When the matter was under discussion, the roads were asked to file copies of their rules, and it was found that out of the 170 roads complying with the request, practically every one of them returned the rules that have been adopted by the Master Mechanics' Association, so that these have become the basis of the federal rules.

Turning back to the boiler inspection rules, the records show that in the first year there were 856 accidents, in the second there were 820, and in the first nine months of the third year there have been but 523.

All the federal authorities ask is that there shall be a close and hearty co-operation between them and the railroads and, for the most part, this has been freely given.

SECRETARY-TREASURER'S REPORT

The secretary's report showed that during the past year \$1,211 was received for dues and from other sources; that there are 543 members, but that some of these are delinquents in the payment of dues, so that there are, today, 417 members in good standing. The treasurer reported a balance on hand of \$647.67 after the payment of all outstanding bills to date.

OXY-ACETYLENE AND ELECTRIC WELDING

The committee on oxy-acetylene and electric welding reported that oxy-acetylene welding seems to be satisfactory in results and in general use. Cracks in firebox sheets of all kinds have been welded with the acetylene process and some very good results have been obtained.

One report shows that cracks 15 in. to 30 in. long have been welded and have given eighteen months' service without trouble; also half side sheets have been successfully welded. Much trouble has resulted, however, from sheets cracking adjacent to the welds, or in the welds themselves, due to the unequal stresses placed upon the sheet when cooling. For reinforcing thin places in sheets such as at washout hole openings, the oxy-acetylene process is of value. The process is serviceable in heating sheets for laying up, in the fitting of boiler work; also in straightening crown sheets where they have been damaged by low water, as the heat can be localized and thus not injure adjacent sheets. It has been found dangerous to make welds adjacent to riveted

seams and staybolts, as both are prone to leak after such treatment when the boiler is again placed in service.

Oxy-acetylene has been found extremely valuable in cutting boiler sheets, engine frames, etc., and in some cases is used preparatory to welding. For use in emergencies, such as on wrecking trains where time is a big factor, it has proved its worth as a cutting agent. In the salvage of broken parts of rolling equipment and of shop machinery considerable savings are reported.

Electric welding is past the experimental stage. One very important point is that it is not dangerous.

Electricity has been used to some extent for cutting, but its greatest value is in welding. Cutting is done with a carbon, using it in the holder the same as the iron rod is used for welding. This method of cutting is not fast, but it can be used in places which are difficult of access with a pneumatic hammer.

Side sheets, half side sheets and patches on firebox sheets are successfully applied, using the welder in joining the sheets just as in a butt joint. Experience has shown that the more crooked the seam the more efficient is the weld, that is, the sheets should be cut in an irregular outline so that the weld will not be in a straight line. The same holds true regarding patches.

From various papers received by the committee the opinion in regard to the manner in which sheets should be fitted to make a good weld seems to be general. The best results have been obtained by placing the sheets about $3/16$ in. apart and beveling them from the fireside about the same as a sheet is beveled for caulking. This allows the metal to burn through into the water space, filling the opening entirely. The welded seam should not be more than $1/16$ in. thicker than the sheet which is welded. Reinforcing the sheet with welding metal is poor practice.

The welding of broken mud rings makes a saving and is done by cutting away the firebox sheet with the fractured mud ring. All the broken parts should be removed to give ample room for the welding. The welding should be done by filling in the opening, welding the firebox sheet and ring together.

Door opening flanges are repaired by setting in a patch, or in many cases applying a collar completely around the opening. This class of repairs is of great value, as in many cases the door opening flanges give trouble, when the remainder of the firebox is in good condition. A large number of door opening patches and collars are reported to have given good service for the past two or three years.

One of the most frequent questions asked in connection with electric welding is what success is obtained by welding over old seams that are damaged by fire, cracked sheets, and old patched seams also damaged. In most cases it is found that it is a very uncertain way of making repairs as in many cases the weld fractures and continues to give trouble. There have been cases, however, where this kind of repairs have held fairly well. Very few cases of welded tube sheet bridges have given satisfactory service.

The best method in welding tubes in the tube sheet is to first apply the tube in the usual manner, viz., place a layer of metal around the caulking edge of the bead, being careful not to put it on too heavily, and hammer it while it is at a white heat. If proper care is taken in hammering this while at a white heat it will leave the metal smooth and will not require turning up. Tubes applied in this manner can be tightened in the sheet in case of leaks from the weld giving out by the ordinary method. In many cases tubes have given double the mileage when welded in, and in all cases show a decided improvement over the former way.

Applying new ends to tubes by the electrical process is being experimented with at present and the results thus far obtained seem to be superior to those obtained by the former. The welding is very smooth and stands well under test. The miscellaneous uses of the electric welder are also numerous, such as repairs to shop machinery, etc.

The report was signed by Frank A. Griffin, chairman.

Discussion.—There was some confusion at first owing to misunderstandings regarding the methods to which the members referred. There was a mass of directly contradictory testimony as to the possibilities and the shop methods to be employed until it was required that each speaker should state whether he was talking of the electric or the oxy-acetylene method.

In the matter of the welding of tubes in the tube sheet, it developed that there had been considerable trouble with the tubes breaking just back of the weld, and in some cases small pieces had broken out, but had been welded in place again without removing the tube. This was especially apt to occur in bad water districts. The welding in of old tubes is not a profitable proceeding, and it is good practice not to weld in any tubes that are more than two or three years old. With new tubes no difficulty has been experienced. The usual method of applying tubes that are to be welded in place is to set them in the ordinary way and then cement them around the edges of the bead with the welder. The older method was to let the tube project through the sheet about $3/4$ in., and then weld it in place. Some tubes have been applied without the insertion of the copper ferrule, but there has been trouble with them and it has been necessary to roll and expand them with great frequency, so that it is always better to use the ferrule.

The application of patches brought out a good deal of discussion, especially as to the best method of holding the sheets while the welding was being done. Two methods were proposed; one was to fit the sheet and lay it loosely in place and then weld, after which the rivets attaching it to the foundation ring or other part were to be driven and the staybolts put in. The other was to drive the rivets and insert the staybolts before the welding was done. When the patch was loosely applied, it was found necessary to drop one end by an amount proportional to the length of the patch and allow it to draw up as the welding proceeded. It was here that the difference of experiences came out. Some stated that it was impossible to put the tight sheet in place, and others that it was unnecessary to do it loosely. It finally came out that with the oxy-acetylene process it was necessary to use a loose sheet, while with the electric weld the sheet could be riveted in place first.

In the application of patches it was found that the oval patch was much more easy to make a success of than the rectangular patch, and that the round patch was better still. Cases were cited where oblong patches measuring 18 in. by 44 in. had been in service for more than a year with satisfactory results.

As for the welding of cracks a number of speakers stated that they had had no success in welding cracks that were more than 12 in. long. Also it must not be expected that the welded crack will last as long or give as good service as the original sheet, and this holds especially where the patch is rectangular. The last side welded has to carry the greatest stress and is most likely to give way, and this is especially true where the weld is made with oxy-acetylene because of the greater heat developed and given out to the sheet and the consequent greater contraction of the welded part.

In the electric welder it was urged that a higher voltage than that usually employed should be used. In one case the first machine worked on a voltage of 250, the second had 500 and it is expected that the third will use 1,500 with greatly improved results.

Firedoors are welded in complete without the use of any rivets. This is done by simply laying the sheets in place and welding along one edge of the lip of one of them. In this way a tight joint is obtained and one that does not require any caulking. In some cases patches were made with a corrugation to take up the expansion with very satisfactory results. The welding of button head stays has been done so successfully that old worn stays have been made as strong as new stays.

Finally it was recommended that for welding the electric process worked the best, while for cutting the oxy-acetylene was much the better.

THE CHEMICAL TREATING OF FEED WATER

T. F. Powers, Chicago & North Western, reported in part as follows on this subject:

Feed water can be treated successfully, if systematized methods are adopted and wonderful results can be obtained, but otherwise it is a waste of money.

The cost of maintaining treating plants will, of course, vary according to the price of chemicals used, which are generally lime and soda-ash, these being the cheapest. There is no additional cost of labor, as the pumper can attend to the plant with his other duties.

Where treating plants are not installed, good results can be obtained by putting soda ash into the tanks of locomotives. The amount per thousand gallons should be determined by the chemist, after an analysis has been made of the water; but in either case, the method of using must be systematic and the blow off cocks on locomotives used regularly. Blow off cocks should be so applied that they can be operated from either side of the cab by the enginemen without getting off the seat box.

One of the reasons soda ash has been condemned by some railroads is because the claim is made that it causes locomotives to foam and that it cuts out valves and packing. This is true if blow off cocks are not used. Soda ash is put into boiler to soften the scale or turn it into a sludge or soft mud. This should be removed through the blow off cocks. Their use will prevent foaming and tend to keep the boilers clean and extend the time between washouts, as it is the opinion of the writer that it is a detriment to the boiler to cool it down and that the longer the washout period can be extended, the better it is for the boiler. With the use of water from treating plants, or using soda ash direct into the tanks of locomotives, the washout period can be extended and the changing of water, in most cases, is unnecessary, provided the blow off cocks are used.

On the Chicago & North Western the locomotives are fitted with a blow off cock on each side, on the outside sheets near the front corner of the mud ring. Our instructions relative to the use of blow off cocks are to blow the engine into blow off tanks when leaving the roundhouse and to use the blow off cocks every few miles on the road, or at least once between every two stations. This is followed closely by the road foremen and master mechanics. The blow off cocks are also used on the arrival at the roundhouse. When blowing off on the road, the blow off cock is only opened from three to five seconds. This does not mean a great loss of water, as practically all that comes out in that time is mud. A good demonstration of this is to open the blow off cock on an engine that has no steam on, but with the water still hot. All that comes out of the cock for the first few seconds is mud, then clear water, showing that it is in the first few seconds that the mud is cleaned out. Another proof is to open a blow off cock against a snow bank or fence; it will be spotted in one place only.

On one 150 mile division of the Chicago & North Western using treated water, a few years ago it was necessary to either change water or wash the boiler at each end of the road. Now with the same water, engines are making 1,050 to 1,500 miles between washouts and are having no trouble on account of foaming. When plugs are removed there is not over 2 in. of mud on the mud ring. This improvement has been accomplished by systematic use of the blow off cocks, as described above.

Summing up the benefits derived from treating water with soda ash and lime in treating plants or putting soda ash direct into locomotive tanks when the blow off cocks are used, they are:

Failures from foaming are practically unknown; washout period is extended; changing of water is not necessary; better circulation is obtained, making better steaming engines; boilers are kept clean, and burnt and buckled side sheets are very

rare; leaky tubes and side sheets are avoided; engines are run longer between shopping for tubes because scale is softened and removed by the blow off cocks in the form of mud; there is a decrease in the expense of upkeep in roundhouse, and a better feeling among men running engines, because engines are not failing on the road due to leaking and foaming.

H. W. Armshaw, Canadian Pacific, made the following report:

During the past 24 years the western lines of the Canadian Pacific have experimented with many different methods of water treatment. The chemicals used were principally lime, soda ash and caustic soda, and although all of them mixed with the water in various ways before entering the boiler, only one of them took care of the sludge.

This method consisted of agitating and settling chamber tanks, with means for removing sludge before the water entered the boiler. This was very satisfactory at times, and prevented heavy scale formation, providing sufficient caustic soda was used to take care of the majority of the sulphate of lime and magnesia, but when treated sufficiently to do this, the engines foamed so badly that we were obliged to resort to round trip washouts. When the quantity of caustic soda was reduced to alleviate foaming, a hard flinty scale developed around the tubes at the back tube sheet end and rosettes and stockings of scale accumulated around the stay-bolts, together with a formation of it on the firebox plates.

The life of tubes and firebox plates was lengthened over what was obtained with crude water, or with any other class of treatment, although it was not determined whether it was more profitable to renew the tubes and fireboxes at intervals to prevent boiler failures or treat the water as described.

During the past 18 months on the Saskatchewan division and for about one year on the Manitoba division, the treating of water by this means has been discontinued and a polarized metallic preparation substituted. The results of the application are, that it is possible to keep the boilers clean with sufficient and proper washing out, to run between general repairs without the removal of any tubes and without failures because of leakage. In no case has it necessitated more frequent washing out than with other methods of treatment. It has in all cases permitted 100 per cent more mileage between washouts and in many cases it is possible to run 200 per cent. So far as we have been able to discover, pitting or corrosion does not follow application of this treatment. It does not aggravate foaming. Its action on the removal of old scale and new formation appears to be more mechanical than chemical in that it does not create a pasty sludge next to the fire plates and tubes, which is common with other treatments and which prevents the water getting into proper contact with the plates, being most difficult to wash off, thus producing overheating of the plates and tubes, which frequently results in boiler failures.

By correctly regulating the period between washouts, with a strict observance of the best practices, accompanied by good water pressure, it is possible to do better than we have previously, inasmuch as the reduction in boiler maintenance and washing out expense has been greatly reduced, together with economy in water consumption, rubber hose, boots, etc., and less general wear and tear on the tool equipment for boiler washing and boilermaking. There is also a large saving in coal and lighting up material because of boilers being hot, due to less washing out, and also an increased earning power of the locomotive because it is available any time without boiler-washing or boilermaker's work.

Taking into consideration the many advantages, I feel quite satisfied in saying that it is more profitable from a mechanical standpoint than any other treatment experimented with during my experience. It is very conveniently applied after each washout, being distributed in bars over the crown

and tubes, or arranged to suit what the inspection indicates to be the proper place to locate it, according to the condition and design of the boiler.

It is too early in our experience to say what percentage of saving is effected in boiler maintenance and boiler repairs because it takes several years to arrive at an intelligent estimate of its use compared with what was formerly obtained. However, my experience with it so far demonstrates that it is a great money saver.

Discussion.—The discussion was very meager and centered around the methods employed in the handling of the boiler where water treatment was used. The main thing that was insisted upon where soda ash is used is that the blow off cocks should be used with great frequency. On one road there is a blow off cock on each side of the engine that can be operated from the cab and the men are obliged to use them either one for each mile run or at least once between stations. Where this rule has been observed there has not been a single case of a burned side sheet, and all difficulties with foaming has disappeared.

Some experience was cited with the different kinds of boiler compounds, but their success hinged to a great extent on the systematic use of the blow off. Polarized mercury came in for a good part of the discussion, and there was a difference of opinion as to its continued efficiency. In one case it was found that it cleaned the boiler of old scale and for a time thereafter seemed to work all right, when hard scale formed and it did not do as well as soda ash. In another case it had supplanted a series of water treating stations that extended over a whole bad water division, to the great saving of expense for the railroad. It does not attack the brass work and greatly reduces roundhouse expenses. In short, it has saved many thousands of dollars, besides doubling and trebling the mileage between washouts.

But when all is said, the success of any compound depends upon its applicability to the particular water that is used.

FLEXIBLE STAYBOLTS IN PLACE OF SLING STAYS

It was merely brought out that there is no advantage in their use insofar as the prevention of the cracking of the flange of the tube sheet is concerned, as the relief of the bending stresses to which that part is subjected does not seem to have any appreciable effect. The reason why they are used in that place is that they are so easy to apply.

COMBUSTION CHAMBERS IN LARGE LOCOMOTIVES

The committee reported that but few railroad companies are using boilers with a combustion chamber to any great extent. The Chicago, Milwaukee & St. Paul has 605 locomotives equipped with combustion chambers. These are of the Mallet, Mikado, Pacific and Prairie types, and are equipped with arch brick tubes.

The first of this class, a Prairie type freight engine, was put in service in 1907, which gives nearly seven years' experience, and should be ample time to demonstrate the benefits derived from a combustion chamber boiler or any weak points or faulty construction. The depth of these combustion chambers is from 32 in. in the Prairie type to 76 in. in the Mallet.

The Prairie type engines have tubes 13 ft. 4 in. long and 2 in. in diameter; the Pacific type tubes are 19 ft. long and 2 in. in diameter; the mikado type tubes are 17 ft. 7 in. long and 2 in. in diameter, and those of the Mallet type are 24 ft. long and 2½ in. in diameter.

The Prairie type engines have service records of more than 185,000 miles between tube settings, the Pacific type more than 196,000 miles, the mikado type more than 90,000 miles and the Mallet type more than 86,000 miles.

There are 195 of the Prairie type, and during the past seven years these engines have been in service over most of the system. While a great many of them are in bad water districts, the tube records show over three years' service from

the majority of the engines, and in many cases 50, 60 and 70 months' service. Twelve of these engines are still in service with the original tubes now having 60 months' service. In this class no new fireboxes have been applied except where damaged by low water. A number of side sheets, door sheets and back tube sheets have been applied, but only two inside throat sheets and one combustion chamber.

There has been but little trouble due to seams leaking. In some cases where there was trouble with seams leaking on top of the inside throat it was found necessary to scarf the sheet down and apply new rivets or bolts, but where this work had been done originally in a proper manner, the seams did not give much trouble on account of leaking.

The only trouble discovered at all was broken braces from the bottom of the combustion chamber to the bottom of the shell. It is believed that the cause of these braces breaking is temperature strain.

The Pacific type engines are giving good service, the firebox sheets standing up well. A few side sheets and a number of back tube sheets have been applied. Over 36 months' service with one setting of tubes is being obtained and with but very little trouble on account of tubes leaking.

A few of the disadvantages of combustion chamber are increased cost of construction; breaking of throat stays; difficulty of removing broken staybolts from the bottom of the combustion chamber; the occasional leaking of seams on the inside throat sheets; the necessity of cleaning out the combustion chamber occasionally due to not keeping the bottom tubes open.

To offset this there are the following advantages: A good free steaming engine due to better circulation and more effective heating surface; less caulking of tubes, longer service as shown by the record, and less cold air striking the tubes; each renewal cost of tubes less on account of shorter tubes; increased life of back tube sheet due to less tube work; decreased cost of renewal of back tube sheet on account of smaller sheet, less labor to apply, no staybolts, no arch tubes, no mud ring; increased life of arch brick on account of not having to knock out the arch when renewing or working the tubes; due to increased combustion space above the fire, the combustion of the coal is improved and the smoke nuisance is greatly reduced; a combustion chamber boiler has a shorter flue, making a saving on the original cost. Fewer tubes are applied, making another saving, and a better tube sheet is obtained, due to wider bridges and better spacing, and therefore a better circulation.

The report was signed by A. N. Lucas, P. F. Gallagher and R. A. Pearson.

Discussion.—One of the advantages of the combustion chamber is that the tube sheet is very much more easily applied than in the case of the ordinary construction. Staybolts break in them, especially in the first row from the tube sheet, but this can be obviated by the use of the flexible bolt. It was also found that where the air pump was placed over the bolts they broke and when it was removed the breakage ceased. In oil burning service it is well to protect the seams with seam brick and this can be obtained of any shapes to cover any part of the chamber that it is desired to protect. Tube failures are very much less with the combustion chamber than without it and there are records of a life of from 150,000 to 200,000 miles. There has been some trouble with the wings on the inside of the chamber, but this was attributed to the quality of the coal that was used and the fact that the seams were not protected with seam brick.

RADIAL STAYS IN THE CROWN SHEETS OF OIL BURNING LOCOMOTIVES

The committee reported that the screw crown bolt and radial stay, with a taper of $\frac{3}{4}$ in. in $1\frac{1}{2}$ in. riveted over on the fire side of the sheets, give the best service. Where crown bars are used an extra heavy wrought iron pipe thimble should be used between the sheet and the crown bar. When radial stays are used they should be riveted over in the same

manner as when crown bolts are used. Some roads are using a taper nut on the bottom end of radial stays over the crown sheet on coal burning engines. This is also thought to be beneficial on oil burning engines. The report was signed by C. L. Hempel, chairman.

EFFECT OF THE METHOD OF FLUE CLEANING ON SCALING

The committee on this subject reported that if the flues are properly cleaned in a rattler, by a dry process, or are run in water, they will not scale up more readily than new flues. Experience indicates that when flues are properly cleaned in the rattler there is no material difference in the mileage obtained, nor in the amount of scale.

There are certain makes or designs of flue cleaners of the rotary type, which leave small crevices in the body of the flue, causing the scale to accumulate very rapidly, and flues cleaned in this manner accumulate the scale more rapidly, and accumulate a greater amount of scale, in the same length of time, than when they are new or cleaned by the rattling process. This kind of a machine does not clean the interior of the flue, which is very detrimental to it. The new or rattled flues are thoroughly clean on the inside.

This system of cleaning flues with a rattler does not cause them to scale after the application to the boiler, if they are thoroughly cleaned and the exterior left in a smooth condition.

Rough and improperly cleaned tubes cleaned by methods which leave the exterior rough and uncleared and crevices in the body of the flue, will undoubtedly scale more readily in the boiler than new or smoothly cleaned ones.

The rattling of dirty tubes in a dry rattler or in water rattlers, or on the chains of an ordinary rattler, seems to be the best form of cleaning, as it not only gives a smooth polished surface on the outside, but loosens and cleans out all the dirt from the interior of the flue. If the flues are properly cleaned in the above mentioned manner they will not scale any more rapidly than new ones, when the same kind of waters are used in the boilers. After all, the amount of scale accumulating on the flues depends almost entirely upon the amount of impurities or chemical properties contained in the water used.

If the flues are cleaned properly on the outside surface with a flue rattler either by the dry process or in the water and the replaced or pieced flues are free from scale and as smooth surface as that obtained with a new flue, the thickness of the body of the flue does not create a condition which accelerates scale formation, although becoming thinner with age. Further, members of the committee have never been able to obtain more flue mileage from a new flue than a rattled one, if the flues are cleaned properly.

The report was signed by B. F. Sarver, H. R. Mitchell and M. J. Guiry.

Discussion.—The discussion strayed off into the method of rattling and was very brief. It was suggested that many of the troubles due to rattling were due to carelessness in the doing of the work where the rattlers were neglected and the tubes were allowed to remain in them for a long time so that they were dented or cracked. Where the work is properly done, the tubes are rattled until they are clean and no longer, and then they are taken out and separated at once into lots representing scrap tubes, those that are to be cut and those that are in good condition. No appreciable difference could be detected in the adherence of the scale due to the method of cleaning the tubes.

As for the cleaning of the inside of tubes of oil burning locomotives there is no difficulty about that, as the regular sanding accomplishes all that is needed. It was recommended that wet rattling be used and that the speed of the rattler be made from 15 to 20 revolutions per minute.

WEDNESDAY'S PROCEEDINGS

On Wednesday the members visited the plants of the Parkesburg Iron Company at Parkesburg, Pa., and the

Lukens Iron & Steel Company at Coatesville, Pa. The proceedings for Thursday, the 28th, will be reported in our next issue.

A. R. A. REPORT ON AUTOMATIC TRAIN STOPS

The Joint Committee on Automatic Train Stops reporting to the American Railway Association at the meeting of May 20 said that after considering the suggestions and criticisms made at the last session of the association, and in the light of its further investigation and consideration, the Requisites of Installation had been somewhat changed. These, it is declared, have been so formulated as "to give free play to suggestions and inventions, while requiring strict adherence to those provisions which, in the opinion of the committee, are essential to safety and efficiency in operation." Not one of the devices for the automatic control of trains which have been tested on a number of roads meets the committee's requirements. "No automatic train control apparatus, so far as known, can be universally applied without adding elements of danger in train operation. The expediency of its installation at any particular point must be determined by all the surrounding conditions.

"The requisites of installation for a train control system, as formulated, are designed for application only where the conditions of traffic are such as to justify the use of an automatic block signal or interlocking system; but the operation of the automatic block signal or interlocking system, if properly installed and maintained, is so near perfect as to indicate that the efforts of operating officials and public authorities should be directed towards the enforcement of obedience to signals rather than in the installation of additional devices."

The committee reaffirms its former declaration "that great care must be exercised in working out a system of automatic train control, in order to avoid the introduction of new elements of danger in operation which may offset those they are intended to overcome.

"The successful stoppage or reduction in the speed of a train composed of many freight cars or of heavy passenger equipment requires the exercise of skill and judgment on the part of the engineman in handling the air brakes. If this is improperly done, serious damage to the train and possibly to the track and to trains on parallel tracks may follow. The sudden application of the brakes by an automatic device without the exercise of intelligence in its performance is, therefore, necessarily hazardous."

The committee finds that on April 1, 1914, experiments with automatic train control devices were being conducted on 12 railroads with 14 different devices.

The requisites, as formulated by the committee, following the full discussion at the autumn meeting of the Association, and as now adopted by the Association, are as follows:

AUTOMATIC TRAIN CONTROL

An installation so arranged that its operation will automatically result in either one or the other or both of the following conditions:

First.—The application of the brakes until the train has been brought to a stop.

Second.—The application of the brakes when the speed of the train exceeds a prescribed rate and continued until the speed has been reduced to a predetermined rate.

Requisites of Installation

NOTE.—These requisites are drawn for application in connection with a properly installed block signal or interlocking system.

1. The apparatus so constructed that the failure of any essential part will cause the application of the brakes.

2. The apparatus so constructed that it will automatically control the train in the event of failure by engineman to observe signals or speed regulations.

3. The apparatus so constructed that it will control the train in the event of a failure of fixed signals to give proper indications.

4. The apparatus so constructed that proper operative relation between those parts along the roadway and those on the train will be assured under all conditions of speed, weather, wear, oscillation and shock.

5. The train apparatus so constructed as to prevent the release of the brakes after automatic application has been made until the train has been brought to a stop or the speed of the train has been reduced to a predetermined rate.

6. The train apparatus so constructed that when operated it will make an application of the brakes sufficient to stop or control the train within a predetermined distance.

7. The apparatus so constructed as not to interfere with the application of the brakes by the engineman's brake valve or the efficiency of the air-brake system.

8. The apparatus so constructed as to be operative when the engine is running forward or backward.

9. The apparatus so constructed that when two or more engines are coupled together or a pusher is being used the apparatus can be made effective on the engine only from which the brakes are controlled.

10. The apparatus so constructed as to be operative on trains moving only with the current of traffic.

11. The apparatus so constructed as to conform to The American Railway Association standard of clearances of rolling equipment and structures.

12. The apparatus so constructed as not to constitute a source of danger to employees or passengers, either in its installation or operation.

13. The apparatus so constructed as not to interfere with the means used for operating fixed signals.

Adjuncts.

The following may be used:

(A) Cab Signal; a signal located in the engine cab indicating a condition affecting the movement of the train and so constructed that the failure of any part directly controlling the signal will cause it to give the "stop" indication.

(B) Detonating Signal Apparatus; an apparatus located along the roadway and so constructed as to give an audible signal by means of a torpedo or other explosive cartridge.

(C) Speed indicator.

(D) Recording Device; an apparatus located on the train and so constructed as to make a record of the operations of the automatic applications of the brakes and of the speeds of the train, and such other records as may be desirable.

The joint committee on Automatic Train Stops consists of the Committee on Transportation and the Committee on Maintenance. The chairman is E. C. Carter, chief engineer of the Chicago & North Western. The members of these committees as given in the proceedings of the association, prior to this year's meeting are as follows: F. C. Rice (C. B. & Q.); A. W. Thompson (B. & O.); E. W. Grice (C. & O.); A. M. Schoyer (Penn.); M. S. Connors (H. V.); B. R. Pollock (B. & M.); P. E. Crowley (N. Y. C.); D. C. Stewart (Penn.); J. B. Yohe (P. & L. E.); F. H. Clark (B. & O.); A. J. Stone (Erie); D. F. Crawford (Penn.); C. S. Churchill (N. & W.); C. F. Felt (A. T. & S. F.); C. A. Morse (C. R. I. & P.); A. T. Dice (P. & R.).

RAILWAY EXTENSION IN SWEDEN.—The railway authorities of Sweden are proposing to embark on a scheme for the extension and improvement of the state railways of that country which will involve a capital expenditure of over \$80,000,000 during the next ten years. Of this amount \$13,200,000 will be used for the electrification of some of the more important main lines, including those between Jerma-Malmo-Trelleborg and those between Gothenburg, Stockholm and Malmo-Gothenburg. It is also proposed to complete the electrification of the Kiruna railway by changing to electric operation the section between Kiruna and the port of Lulea on the Bay of Bothnia at a cost of \$2,100,000. The other section to the Norwegian frontier is already being electrified.

TAXATION OF PUBLIC SERVICE CORPORATIONS

The National Tax Association submitted the question of "The Equalization of Taxation upon Public Service Corporations subject to ad valorem taxation" to a committee, which made its report at the annual meeting of the association, in Buffalo, in October, 1913.

The report of the committee, prepared by Professor Charles J. Bullock of Harvard University, which has just been published, treats this subject in a practical and illuminating manner. Three questions were considered. First, should public service corporations be subject to special taxation much heavier than that imposed upon other classes of business or property because they hold special franchises of great value? Second, does effective regulation of public utilities make it unnecessary to equalize taxes of public service corporations, with the taxation of other business or property? Third, should taxation of public service corporations be governed by the general rule of equality?

The committee gave as the reason for rejecting the first and second theories, that effective regulation completely alters the incidence of special taxes upon monopolies and at the same time removes the evil which has led many to demand such taxation.

In addition, exemption from all taxation would presuppose reduction in charges or improvement in service corresponding to the benefits derived from such exemption, or, on the other hand, taxes might be increased to any desired extent without injustice, provided rates for services were permitted to be increased in corresponding degree. With exemption the public would secure untaxed service, and, with increased and disproportionate taxes, the government would employ public service corporations as agencies for the collection of heavy taxes. These theories the committee was compelled to reject as unsound.

It held that equality should be the controlling principle in governmental affairs and that in none is it more necessary than in the matter of taxation. Equality of taxation must be real and not formal. Where conditions differ equality cannot be obtained by the iron rule of uniformity. The committee discussed and approved the doctrine of classification and held that "without classification, real, as distinguished from formal, equality is absolutely unattainable. Our tax laws must recognize the economic differences of the various classes of property." "Classification can be approved only so far as the circumstances of each case justify it, and the presumption is always in favor of uniformity." "The taxation imposed upon public service companies should be the same as that imposed upon property subject to the full rate of state and local taxation." Having assumed that public service corporations should be taxed at the same rate as real estate and other property, the committee further discussed questions concerning application of this principle. It was clearly of the opinion that equality does not require ad valorem taxation, but that taxes upon gross receipts, or other specific taxes, can be adjusted, from time to time, so as to make them substantially equivalent to the rates imposed upon all unclassified property.

The committee closes its report as follows: "Whether public service corporations are taxed at local or at average state rates, they should be subject to the true, and not the nominal, rates of state or local taxation. So long as undervaluation of other property continues, therefore, we hold that either the valuation of public service corporations should be made on the same basis as that of other property, as is the practice in a few states, or that the corporations should be taxed at the true rate imposed upon other property, as is the practice in Wisconsin. Better still would be the eradication of the evil of undervaluation of property by the local assessors as is now attempted in Kansas, Arizona, Colorado and New Mexico; but this must necessarily be a work of time, and in the interim public service corporations are entitled to fair play."

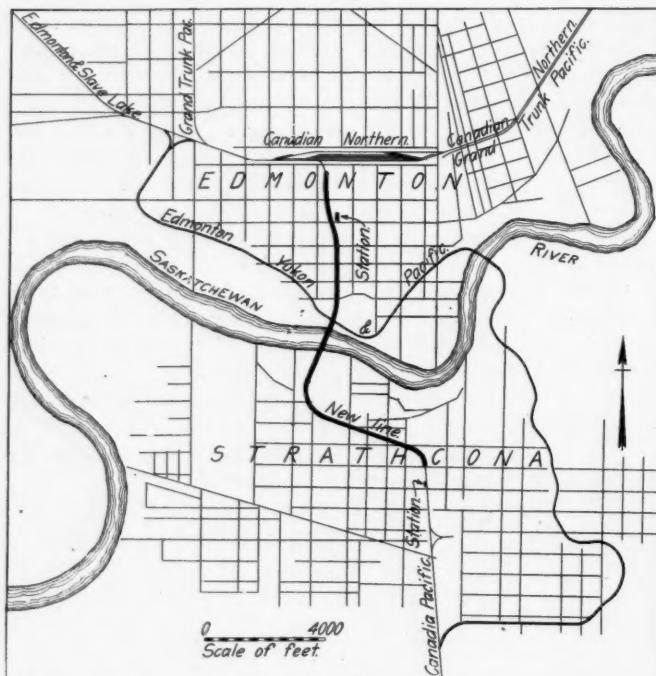
RAILWAY EXTENSION IN SIBERIA.—The Amur Railway has been opened to Blagovestchensk, Siberia.

CANADIAN PACIFIC BRIDGE AT EDMONTON, ALBERTA

By F. M. PATTERSON

The Canadian Pacific has recently completed its new bridge over the North Saskatchewan river at Edmonton, Alb. When this road was built into this territory terminals were established at Strathcona, a suburb on the southerly bank of the North Saskatchewan river about two miles from the business center of Edmonton. A passenger station was built there and freight was transferred to Edmonton under a traffic agreement with the Edmonton, Yukon & Pacific.

This river is typical of the rivers of the Canadian prairies,



A Portion of Edmonton and Strathcona, Showing the Location of the Old and New Crossings of the River

flowing in the bottom of a narrow valley which ranges from half a mile to a mile in width, with sides falling abruptly from the general level of the prairie. The Edmonton, Yukon & Pacific descends from Strathcona to a low level swing bridge used also as a highway bridge and ascends to the level of Edmonton over a route which is necessarily cir-

The upper level of the new bridge carries a single track of the Canadian Pacific on the center line with a street car track on either side spaced 12 ft. 6 in. center to center from the railway track, the necessary width being provided by



General View of the Valley Between Edmonton and Strathcona, Showing Old Low Level Railroad and Highway Bridge on the Right

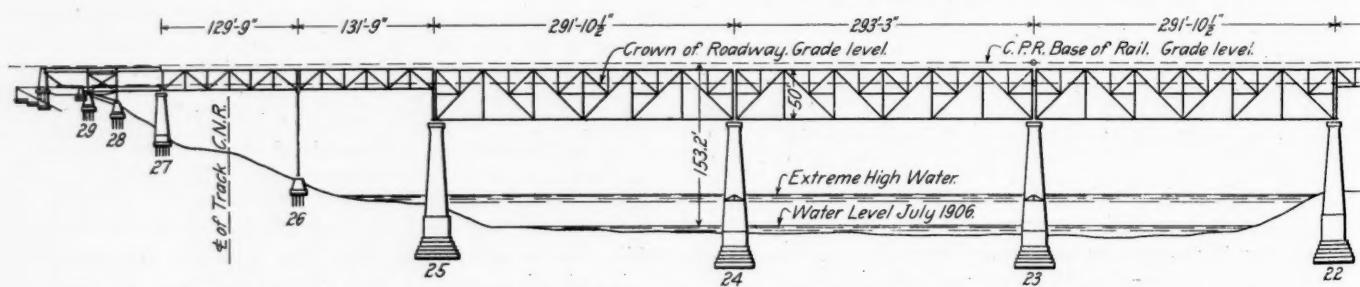
using floor beams extending beyond the outside of the trusses.

The roadway deck is carried between the trusses at a uniform



The River Spans of the Canadian Pacific Bridge at Edmonton

distance below the base of rail and consists of a creosoted wood block pavement on a reinforced concrete floor, the total thickness being 14 in. at the crown. An 8-ft. sidewalk is provided on each side bracketed to the outside of the trusses.



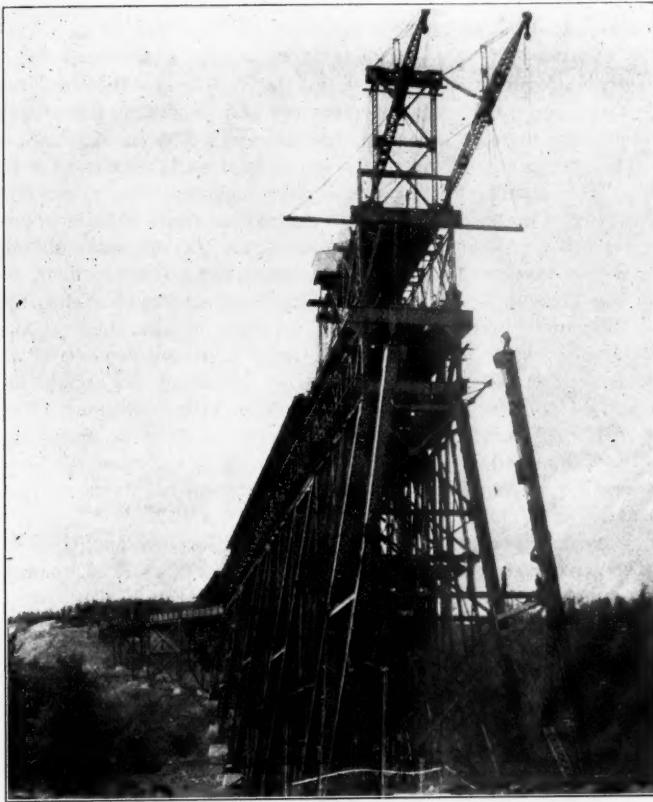
General Elevation of the Canadian Pacific Bridge Over the North Saskatchewan River at Edmonton

cuitous and involves heavy grades. This bridge was the only one crossing the river at Edmonton.

The new bridge, being double-deck, is utilized for highway and street car as well as railway traffic. The plans are so worked out that there is no possible interference of any one class of travel by the others, and from an economic standpoint the saving in grades and distance is quite as important to the city as it is to the railway.

The bridge consists of three main double-deck truss spans over the river, 288 ft. long with trusses 50 ft. deep and 25 ft. center to center. The Edmonton approach consists of two double-deck truss spans, one 131 ft. 9 in. long and the other 129 ft. 9 in. long, both having trusses 19 ft. deep spaced 25 ft. center to center. At the north end three short girder spans are used to enable the highway deck to swing outside from under the upper deck in order that the highway will clear

the slope of the embankment. The Strathcona approach consists of a tower and deck truss structure with spans of 49 ft. 5 in. on the towers and of 97 ft. 8 in. between towers. At the south end girder spans are again used to divert the roadway, which in this case is carried up to a level with the railway tracks at a point about 250 ft. south of the south abutment, at a point where the railway passes from embankment to cut.



Erecting One of the Steel Bents in the Approach to the Edmonton Viaduct

The highway and street car tracks continue to rise until the grade of Anthony street is reached, this street being carried over the railway.

The piers for the tower and bent foundations are of concrete, on concrete piles, while those for the main spans are also of concrete carried down to solid foundation below danger of scour. As the river is subject to rapid fluctuations of stage, with considerable drift during high water the false work for the main spans consisted of trestle towers at each

of the Canadian Pacific, and was fabricated and erected by the Canadian Bridge Company, of Walkerville, Ont. The construction in the field was under the charge of F. W. Alexander, division engineer, to whom the writer is indebted for information.

RAILWAY STOREKEEPERS' ASSOCIATION

A report of the proceedings of the eleventh annual convention of the Railway Storekeepers' Association, held at Washington, D. C., May 18, 19 and 20, was published on page 1135 of the *Railway Age Gazette* for May 22, 1914. Three papers were presented at the convention on the subject of How to Obtain the Greatest Efficiency from Employees in the Store Department.

The following is taken from a paper by W. D. Stokes, general storekeeper, Central of Georgia:

Irrespective of the convenience, at times, of having it otherwise, the stern fact cannot be evaded that there is no period in any business career which may be correctly characterized as that of standing still. Progression or retrogression is invariably in process, no matter how imperceptible.

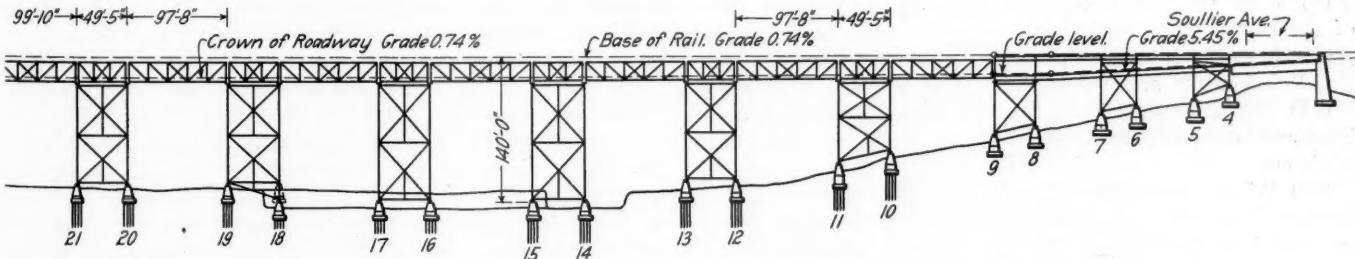
A generally accepted precedent in the organization and conduction of affairs, military, civic and commercial, is that the personality of the leader enters largely into their success and it would, therefore, appear as a logical sequence, that one of the fundamentals in obtaining efficiency in any undertaking is a careful consideration of the requirements of the person to be selected to act in the capacity of executive.

Organization is largely a matter of instinct, experience and common sense in the selection of subordinates who are capable of fulfilling the requirements, judgment frequently of necessity being deferred, and the systematic assembling of forces in accordance with a definite plan as to what is necessary to conform to the contemplated system.

The diversity of opinion as to detail of the type of organization best adapted to requirements is so great, and the results as obtained from diametrically opposite arrangements are so uniformly satisfactory, that it would appear that this subject has nothing in common therewith and that the principal point at issue is how best to regulate and inspire to bring about an economical and satisfactory conservation of the material and supply investment, and distribution and accounting for it, without embarrassment to operation.

However, no matter how carefully the organization is planned failure to observe certain injunctions will cause the work to go for naught.

It is impossible to successfully lay down hard and fast rules for the entire government of any body of employees, local conditions and temperament, if no other reasons, making this prohibitive and, while it is conceded that discipline is an absolute



General Elevation of the Canadian Pacific Bridge Over the North Saskatchewan River at Edmonton

panel point. The separation of grades between the railway and the streets in Edmonton was accomplished in a very satisfactory manner. Saskatchewan avenue, the first street encountered after leaving the bridge, is crossed overhead on a steel structure. Hardisty avenue is crossed at grade and McKay and Victoria avenues are carried over the tracks by concrete structures.

The bridge was designed by P. B. Motley, bridge engineer

essential, other important adjuncts should be brought into play. Uncontrollable temperament has no place in the daily walk of successful business life.

Inspire by precept, example, fair play and personal interest that confidence essential to efficiency, without which no organization can hope to succeed, and the encouragement resultant therefrom will bring a loyalty and willingness which cannot but be productive of results. As you regard your subordinates, so

you may expect others to do. Disparagement by inference, or otherwise, exerts a contaminating influence difficult to overcome. Disloyalty or indifference may be quickly bred by such tactics and the most carefully built up organization disrupted. Forbearance therefore should be cultivated.

Application is worthy of a prominent place in the consideration of this subject, as without this sterling quality there is little hope for success, either upon the part of the executive or the organization. The misguided idea that affairs are in such shape as to automatically conduct themselves or, at worst, require supervision of only a superficial character, is a fallacy which has frequently caused otherwise perfectly capable men to wonder why some of their fellows were getting the promotions. It can safely be said that the only thing a department will do automatically, is go to pieces.

The following is taken from a paper on the same subject by F. R. Brown, Oregon-Washington Railroad & Navigation Company:

Supplementing this subject let us consider when the greatest efficiency has been obtained from employees of the store department.

The store department has attained a high degree of efficiency—

(1) When it has, by careful calculation and the exercise of good judgment, anticipated the regular requirements of its customer, the railroad, and stands ready to deliver the goods on demand.

(2) When the stock carried is a minimum.

(3) When purchases or other sources of replenishment are a minimum. This is interlocked with the subject of paragraph (2), but it goes deeper, because a large percentage of purchases does not affect the storekeeper's books.

(4) When the investment of the railroad's funds in material is wisely proportioned to the demand therefor.

(5) When material received is of the grade or quality specified in the purchase order, whether covered by written specifications or not.

(6) When requisitions are intelligently questioned, when necessary, intelligently filled and as nearly as possible to the time of actual requirement; also when the material furnished is that which is best adapted to the purpose of circumstances, and not higher in grade, and therefore in cost, than is actually necessary.

(7) When deliveries or shipments of material are followed up to see that salvage is given into the custody of the store department and that such salvage is most economically disposed of. In order to secure best results in this, I believe that requisitions should be printed with a detachable numbered salvage coupon so that where salvage cannot accompany the requisition for new material, the coupon can be detached and held until such time as the salvage does come to hand.

(8) When scrap piles have been searched for the recovery of all salvable material.

(9) When attention is called to instances of misuse or abuse of the company's material when observed, even though it has passed from the custody of the store department.

(10) When the actual cost of handling stores is a minimum.

(11) When the differences between value of actual stock on hand and book value, as disclosed by the annual inventory, are a minimum.

(12) When conservation of lumber and other material is practiced to the extent of securing the highest possible class of service from it at every stage, from new to what is frequently mis-called scrap.

This list could be doubled without reaching the limits of the store department's possibilities. The adoption of these twelve principles, and the addition to them of any others that suggest themselves is recommended; also that they be printed and a copy furnished to each employee.

This subject was also dealt with by E. J. Roth, general storekeeper, Chicago, Indianapolis & Louisville. He said in part:

From the many definitions of an efficient store department, I would select the following: An efficient store department is one which is so organized and operated as to be able to promptly

supply the proper material to be used by employees in any other department of the service, with the minimum cost to the company, considering not only the physical handling and the actual accounting for the material, but the interest on the money invested in the material itself, in the buildings and yards for its proper storage and appliances for its economical handling, together with the loss due to depreciation in material and facilities, necessary insurance, and all incidental expenses.

The individual efficiency of its employees is of value to a railroad company only in so far as it increases the earnings, or decreases the expenses of that company, and the team work obtained through proper organization with clearly defined duties and responsibilities for its various members and providing for proper supervision must be secured if real efficiency is to be had.

The proper arrangement of material in store houses and yards, from the standpoint of accessibility, including the systematic grouping of material of the same general kind in a definite order, is essential. All articles on shelves or in bins or racks should be within easy reach of men standing on the storeroom floor, or on the ground if the material is kept out of doors. The loss of time and energy expended in climbing up the sides of the building, or upon high shelving to reach articles stored 10 or 15 ft. from the floor, does not assist in obtaining reasonable efficiency from men who must work under such conditions. The providing of mechanical appliances, such as derricks and magnets, will materially assist in securing efficiency from the men where the kind and amount of material handled warrant the expense.

A most important factor is uniformity. When applied to a store department, this is a very broad term. The most economical and otherwise satisfactory manner of ordering and receiving material should be determined and this method essentially followed at all store houses and material yards. The most satisfactory arrangement of material in store houses and yards should be determined and made uniform. Uniform accounting methods should be put into effect and, in fact, the one great object ever before the storekeeper must be to secure uniformity throughout his entire organization.

Employees of a department, the methods of which are uniform at all points, can be transferred from one store to another, and take up the work of the new position effectively at once without loss of time in teaching them the methods in use at their new location.

Efficiency from unskilled laborers employed in the physical handling of heavy materials in considerable quantities can be secured by a proper piece work system for payment of the men. I do not wish to be misunderstood in this. Piece work is not a panacea for all of the ills besetting a storekeeper; in a ware-room where small quantities of many different kinds of material are handled it is of doubtful value, to say the least.

The securing of individual efficiency from unskilled laborers is simple in comparison with the difficulties encountered in securing efficiency from the more important members of the store department organization, the wareroom men, the stockmen, clerks, foremen and storekeepers. These men constitute the backbone of the organization. By the results of their efforts the department will, in a great measure, be judged. The men to fill these positions should be selected with great care. To aid in their selection and education, for the particular work for which each shows particular fitness, an apprentice system carefully planned and even more carefully followed up should be of material assistance.

Not many years ago, it was possible to obtain from our laborers' ranks, men who could competently fill the positions of foremen, and could, in many cases, continue on up to the top of the organization. Needless to say, few if any of the foreign laborers we must use in most localities today are capable of this. We cannot get young men of the proper caliber to eventually fill executive positions, to work on the same basis as these foreigners. We must make them see that they will receive special education and attention, and reasonable advancement. A proper apprentice system provides such inducements.

The store department is fast coming to be recognized for what it should be. The opportunities are greater in the department today than ever before, and really competent store department men are remarkably few. We must make our younger employees see this and, by careful instruction, judicious criticism and constant encouragement, train them to fill the need.

ANNUAL GOVERNMENT SIGNAL BULLETIN

The annual statement of the Interstate Commerce Commission, giving statistics of signals on the railroads of the United States, which was noticed briefly in our last issue, shows the mileage of railroads block signaled, with the usual details; and also a great amount of data concerning interlocked switches and signals. In the 12 months ending January 1 last the length of road equipped with automatic block signals increased 4,350 miles, an increase more than twice as great as that reported in the last preceding bulletin. This and the other principal changes are shown in the following table:

Length of Railroad on Which the Block System Is in Use			
Miles of road—	Jan. 1, 1914	Jan. 1, 1913	Jan. 1, 1909
Automatic	26,569.3	22,218.8	12,190.6
Manual	60,167.6	61,731.0	47,358.1
Total	86,736.9	83,949.8	59,548.7
Changes—			
Automatic	I. 4,350.5*	I. 10,028.2†	.....
Manual	D. 1,563.4*	I. 14,372.9†	.....
Both kinds	I. 2,787.1*	I. 24,401.1†	.....

* Increase or decrease compared with 1913.

† Compared with 1909.

The principal mileage table is produced on the two pages following this. The bulletin contains numerous footnotes giving

Principal Increases and Decreases

Name of railroads.	Increase.		Decrease.
	Automatic.	Nonauto-matic.	Nonauto-matic.
Atchison, Topeka & Santa Fe: Coast lines.....	Miles.	Miles.	Miles.
Atlantic Coast Line.....	142.4	.....	86.0
Baltimore & Ohio.....	125.4	.....	73.0
Baltimore & Ohio Southwestern.....	73.9	.....	35.1
Baltimore, Chesapeake & Atlantic ¹	35.1	.....	.....
Buffalo, Rochester & Pittsburgh.....	112.3	.....	92.0
Carolina, Clinchfield & Ohio.....	11.0	.....	.....
Chesapeake & Ohio.....	168.9	.....	.....
Chicago & Eastern Illinois.....	105.8	.....	103.1
Chicago & North Western.....	59.7	.....	62.2
Chicago, Burlington & Quincy.....	30.6	.....	136.1
Chicago Great Western.....	63.0	.....	40.0
Chicago, Indianapolis & Louisville.....	132.2	.....	363.0
Chicago, Milwaukee & St. Paul.....	253.0	.....	1,247.2
Chicago, Ottawa & Peoria ¹	15.9	.....	.....
Chicago, St. Paul, Minneapolis & Omaha.....	82.2	.....	82.5
Copper Range ¹	78.7	.....	.....
Delaware, Lackawanna & Western.....	54.4	.....	.....
Denver & Salt Lake ¹	34.1	.....	.....
El Paso & Southwestern ¹	99.2	.....	.....
Erie.....	323.2	.....	237.5
Great Northern.....	362.6	.....	12.2
Illinois Central.....	197.7	.....	.....
Lehigh & Hudson ¹	23.6	.....	.....
Ligonier Valley ¹	14.2	.....	.....
Louisville & Nashville.....	36.2	.....	.....
Maryland, Delaware & Virginia ¹	78.4	.....	.....
Missouri, Kansas & Texas Ry. Co. of Texas ¹	101.7	.....	.....
Nashville Terminals ¹	5.9	.....	.....
New York Central Lines:			
Chicago, Indiana & Southern.....	94.8	.....	.....
Cleveland, Cincinnati, Chicago & St. Louis.....	67.3	.....	64.8
New York Cen'ral & Hudson River.....	53.7	.....	154.4
Toledo & Ohio Central.....	6.3	.....	.....
Zanesville & Western ¹.....	.8	.....	.....
New York, Chicago & St. Louis.....	131.7	.....	.....
New York, New Haven & Hartford.....	26.4	.....	64.0
Northern Pacific.....	416.0	.....	231.7
Oregon Electric ¹	7.0	.....	.....
Pennsylvania:			
Grand Rapids & Indiana.....	120.1	.....	101.2
Pennsylvania Co.....	85.5	.....	.....
Pittsburgh, Cincinnati, Chicago & St. Louis.....	217.4	.....	.....
Pere Marquette.....	15.9	.....	246.6
Queen & Crescent Route:			
Alabama Great Southern.....	49.9	.....	19.0
Rochester, Syracuse & Eastern ¹	24.6	.....	74.0
St. Louis & San Francisco:			
New Orleans, Texas & Mexico.....	14.0	.....	157.6
Seaboard Air Line.....	136.5	.....	105.9
Southern.....	13.7	.....	333.6
Southern Pacific, Pacific System.....	51.3	.....	7.1
Wabash.....	.....	.....	89.9
Total.....	3,828.4	1,887.2	3,247.0

¹ Roads which have not heretofore reported block-signal mileage.

ing explanatory information, in connection with this table, which need not be repeated in this place, most of the data being that which has already been published several times. The Pennsylvania Railroad reports an increase in block signal mileage (although its report showed 100 per cent. signaled a year ago) which is due to the fact that passenger trains are now run over lines, equipped with the block system, which formerly were used exclusively for freight trains. The government asks for statistics only of lines on which passenger trains are run. The Pennsylvania, in addition to its tabular statement, reports 163 miles of road (244 miles of track) equipped with block signals and used exclusively for freight trains. The Pennsylvania also reports that it has the controlled manual system, with continuous track circuits, in use on 21 miles of road (44 miles of track) to provide for movements of trains in the direction opposite to the ordinary current of traffic.

The principal increases and decreases in mileage are shown in the table reprinted on this page. In the case of the New York Central there is a decrease, not only in the mileage of road operated by the manual block system, but also in the total length of lines operated by the company for passenger business; but the change is apparent rather than real, for the actual passenger mileage and the percentage block signaled both remain substantially unchanged. A long section of four-track line formerly part manual and part automatic, and reported as two two-track lines now appears as four-track, all automatic.

Twelve sections of road of considerable length are each operated jointly by two companies, and the mileage is entered in the table against both of them. This makes the totals of table No. 1 about 500 miles larger than the actual total length of road signaled. Some of these items are not separated as between automatic and non-automatic, but the greater portion appears to be automatic signaling; and as these duplications have not been so fully explained in former bulletins, it may be that the total increase in automatic block signal mileage during the year, as stated above, is somewhat excessive. On the other hand there are automatic signals controlled by track circuits, on 179 miles of road where trains are regulated by the manual block system. These automatic signals are not included in the tables and do not appear in the totals.

Table No. 2, Kinds of Automatic Signals in Use, shows a decrease in the mileage of road equipped with enclosed disk signals and a large decrease in the mileage equipped with electro-gas signals. The Delaware & Hudson has taken out the electro-gas apparatus on 362 miles of road. There is an apparent increase in the mileage of exposed disk signals, but this evidently is due to an error in the report of the New York, Ontario & Western in 1913. The mileage of road having automatic block signals arranged "normal danger" has increased from 6,941 miles to 7,465 miles. The Chicago & Alton and the New York Central have made large increases in this column, while the Erie and the Illinois Central report a decreased mileage of normal danger.

From Table No. 2 it appears that the length of road on which telephones are used in the operation of the manual block system has increased from 23,002 miles in 1913, to 26,241 miles in 1914.

Table No. 4 gives the usual details concerning practices in the operation of the manual block system. The length of single track road on which the space interval is worked only for the protection of the rear of trains and not as a preventive of butting collisions, is 17,486 miles.

A new table has been added, giving additional data pertaining to block signals, some of which, however, in former years has been given in other forms. This table gives the length of road on which alternating current is used for track circuits and for signal operating circuits; the number of miles of road on which three position signals are used; on which upper quadrant semaphores are used and on which electric lights are used in signals.

This table shows 13,001 miles of road equipped with automatic block signals on which the overlap is used; but there is nothing to show how much of this mileage has distant signals. On

much of it, no doubt, the overlap is provided because of the absence of distant signals.

This table shows also the color of the night indications of block signals. The roads on which green is used for the clear indication are the following:

**Arizona & New Mexico
Atchison, Topeka & Santa Fe
Auburn Electric
Baltimore & Ohio Southwestern**

Cincinnati, Hamilton & Dayton
Bangor & Aroostook
Bessemer & Lake Erie
Boston & Maine

Buffalo, Rochester & Pittsburgh
Butte, Anaconda & Pacific
Central New England
Chicago & Alton
Chicago & Eastern Illinois
Chicago & North Western
Chicago Great Western
Chicago, Indianapolis & Louisville
Chicago, Peoria & St. Louis
Chicago, Rock Island & Pacific
Chicago, Terre Haute & Southeast'n
Delaware & Hudson
Delaware, Lackawanna & Western

Denver & Salt Lake
Durham & Southern
Elgin, Joliet & Eastern
El Paso & Southwestern
Erie
Hudson & Manhattan
Illinois Central
Illinois Traction
Kentucky & Indiana Terminal
Lehigh & Hudson River
Lehigh & New England
Lehigh Valley (part)
Long Island

MILEAGE OF RAILWAYS OPERATED UNDER THE BLOCK SYSTEM, JANUARY 1, 1914

Louisville & Nashville	Mobile & Ohio	Cleveland, Cin., Chic. & St. Louis	New York, Ontario & Western
Maine Central	Munising, Marquette & Southeast'n	New York Cent. & Hudson River	Northern Pacific
Minneapolis & St. Louis	New York Central Lines	Pittsburgh & Lake Erie	Northwestern Pacific
Minn., St. Paul & Sault Ste. Marie	Boston & Albany	Toledo & Ohio Central	Oregon Electric
Missouri, Kansas & Texas	Chicago, Indiana & Southern	New York, New Haven & Hartford	Pennsylvania (part)

MILEAGE OF RAILWAYS OPERATED UNDER THE BLOCK SYSTEM, JANUARY 1, 1914—(Continued)

Philadelphia, Balt. & Wash. (part)	Spokane, Portland & Seattle
Peoria & Pekin Union	Syracuse, Lake Shore & Northern
Pere Marquette (part)	Terminal R. R. Assn. of St. Louis
Alabama & Vicksburg	Texas & Pacific
New Orleans & Northeastern	Union Pacific
Richmond, Fred. & Potomac (part)	Oregon-Washington R. & N. Co.
Rochester, Syracuse & Eastern	Oregon Short Line
St. Louis & San Francisco	Virginian
St. Louis Southwestern	Wabash (part)
San Francisco-Oakland Terminal	Washington Southern (part)
San Pedro, Los Angeles & Salt Lake	Washington Terminal
Southern Illinois & Missouri Bridge	Washington Water Power Company
Southern Pacific	Western Pacific
Snokane & Inland Empire	

Where green is used for "proceed" yellow is used for the caution color in the distant indication, except on the Chicago & North Western, where it is a combined light; red and green, side by side.

Alternating current is used for track circuits on 3,289 miles of road, 4,145 miles of track; for signal operating circuits on 1,643 miles of road, 3,681 miles of track. Three-position automatic signals are used on 9,976 miles of road, 17,812 miles of track; upper-quadrant automatic signals on 10,427 miles of road.

nal circuits; approach locking; time locking; route locking; detector circuits; facing point locks; bolt locks; switch and lock movements; detector bars; also the number of hand thrown switches within interlocking limits which are controlled from towers, and those not controlled from towers and, finally, the number of outlying switches controlled from towers. This table also gives the colors of night indications in signals. As a stop indication purple, as well as red, is used on the following roads (the purple being used presumably only on dwarf signals):

Atchison, Topeka & Santa Fe; Baltimore & Ohio Chicago Terminal; Bessemer & Lake Erie; Chesapeake & Ohio; Chicago & Alton; Delaware & Hudson; Delaware, Lackawanna & Western; Missouri, Kansas & Texas; New York, Chicago & St. Louis; Indiana Harbor Belt; New York Central & Hudson River; Northern Central; Philadelphia & Reading; St. Louis & San Francisco. The Maine Central and the Newburgh & South Shore use blue where the other roads named use purple; and

INTERLOCKING STATISTICS OF PROMINENT ROADS, JANUARY 1, 1914—FROM TABLE NO. 6

17,756 miles of track. Electricity is used for lighting signals on 2,403 miles of road, 4,770 miles of track. The roads making the largest use of electric lights in signals are:

the New York, New Haven & Hartford uses both blue and purple.

In table No. 7 there are many blank spaces under some of the headings, indicating that not all of the roads gave complete information. In tables 6 and 7 no footings are given for any of the columns, for the reason that there are many duplications, the same plants being reported in some cases by two or more roads.

Telephones are used in the transmission of train orders on 77,292 miles of road or 9,195 miles more than was reported one year previously. The twelve-month increase in this mileage was about the same as in 1912.

Copies of this report may be procured from the Superintendent of Documents, Government Printing Office, Washington, at ten cents each.

Tables 6 and 7, showing the number, types and characteristics of interlocking plants in service January 1, 1914, fill nearly seven pages of the bulletin. The style of table 6 is indicated by the extracts from it which are shown herewith, giving the data concerning forty prominent roads. Table No. 7 gives for each road the number of interlocking plants using oil, gas or electric current in signal lamps; direct current and alternating current track circuits; direct current and alternating current switch and sig-

Railway Telegraph Superintendents' Convention

Carefully Prepared Papers on Construction of Telegraph Lines, and the Maintenance of Telephone Apparatus

The thirty-third annual convention of the Association of Railway Telegraph Superintendents was held in New Orleans May 19-22 and was largely attended. A large number of new members were elected, and the total membership at the present time is 203, consisting of 120 active members and 83 associates. W. W. Ryder, general manager of the Western Union Telegraph Company, Chicago, and a former active member of the association, was elected an honorary member. Secretary P. W. Drew read his report and that of the executive committee. Three deaths occurred during the year, including that of William Kline, former superintendent of telegraph of the Lake Shore & Michigan Southern, a charter member.

The report of the Tension Crossing committee, G. A. Cellar, chairman, made certain recommendations, all of which were agreed to. At the afternoon session M. B. Wyrick, division plant superintendent of the Western Union, Dallas, Tex., presented a paper on organization of gangs, and plans for boarding men. He described in considerable detail the duties of foremen; methods of providing for the board and lodging of men in camps and also in boarding houses; equipment of camps and camp car outfits, rates of pay, sizes of gangs, etc.

In the discussion J. F. Caskey (Lehigh Valley) stated that he found it better to work small gangs rather than large ones. When there are too many men they get in one another's way. He thought it important that foremen look after the physical and moral welfare of the men. On his road the men preferred boarding houses to camp cars. The latter afforded no amusement. The Lehigh Valley allows the men a certain amount a day for expenses. He explained the duties of the general foremen on his road.

G. A. Cellar (Pennsylvania Lines West) did not favor camp cars. They were generally overcrowded and hard to keep cool in hot weather.

J. McMillan (Canadian Pacific) explained the practice on his road. He favored the boarding car; his men were better satisfied, besides it was difficult to arrange for the boarding of men at houses in his territory owing to the distances to go. William J. Camp of the same road told of his experience with a gang of men. The men did not like hotels, but were happy in boarding cars. A good foreman, he said, could handle eighteen or twenty men.

M. B. Overly, engineer in the telegraph department of the C. C. C. & St. L., read in abstract a paper on the maintenance of telephone and telegraph equipment. He said, in part:

"Our own experience was probably very similar to that of all other roads. We built and equipped seven telephone despatching circuits in about three months. None of our regular men knew anything about telephones and few of them knew what a selector looked like. Our installers were telephone men we picked up here and there and a few of our stationed linemen were used to help out. When we finished the installation of the first circuit we immediately put it into service and started to work on the installation of another one. We had scarcely left that territory, however, before little things began to happen on that circuit. We had no wire chiefs and our chief despatchers and despatchers knew nothing about testing on telephone circuits. If a fuse blew out in the main battery or some simple trouble developed, there was no one who knew how to make the simplest kind of a test. This resulted in our being compelled to take the best man available, out of one of our gangs, and put him in charge of the telephones on that division. This man had been a lineman at one time, but he had developed into a telephone equipment man and finally into a telephone wire chief. Because of the fact that we had no wire chiefs he had to be a sort of a traveling wire chief and equipment inspector. If a case

of trouble came in he first made a test to find out whether it was line trouble or equipment trouble; if it proved to be line trouble the stationed lineman went after it, but if it proved to be equipment trouble the inspector went after it himself. At first we did not tie him down to any very hard and fast rules to follow, but allowed him to use his own judgment to a considerable extent. As time went on, however, we employed wire chiefs for all of the more important points on our road. These men immediately took charge of all testing and in addition to this looked after the handling of duplex apparatus and telegraph repeaters and in some cases also acted as manager of the office. We then relieved the inspector of all testing and required him to inspect every office in his territory at least once every thirty days. We required him to inspect the despatchers' master equipment and main battery once each week. On his inspection trips, the inspector carried with him a supply of cords, mouthpieces, receiver shells, diaphragms, etc., together with a supply of dry batteries, so that he could fix up any case of trouble that might develop. Our aim was to anticipate trouble rather than to wait until it came. These men were each given about three hundred miles of road on which there is a despatchers' telephone circuit, a station to station telephone block circuit, and a number of siding and yard telephone circuits. We supply them with simple blue prints of all circuits in use in their territory. They are also supplied with all specifications that we get up or use and we try to keep them supplied with everything they may need in the way of telephone apparatus parts. We believe it pays to keep these men well supplied so that they do not have to wait on equipment to clear trouble. I overheard a superintendent remark a year or two ago that he made his men coax him for material so they would not use so much. In my opinion a policy of that kind can only result in disaster. The men will be compelled to do shoddy work and will gradually drift into doing that kind of work at all times.

"There has been considerable discussion in regard to the advisability of maintaining a repair shop. My experience has been that it does not pay to attempt to rebuild equipment, to rewind coils or to do any repairing that requires any great amount of machinery. I find it cheaper to return to the manufacturer apparatus requiring repairs of this kind and have them do the work. I find it is economical to purchase repair parts for replacement so that the telephone inspectors, or the man in the storeroom can replace the defective parts, such as induction coils, ringer coils, etc. Those roads that are located a great distance from the manufacturers might find it advantageous to do considerable repairing and to provide an up-to-date shop, but it will be necessary for them to go to a considerable expense to equip this shop and they will have to get a high grade man to run it."

In the discussion of this paper, W. E. Harkness (Hall Switch & Signal Company) emphasized the necessity of establishing more definite standards and specifications for the installation of inside wiring; keeping definite and complete records of equipment in use, together with a system of periodic inspection based on such data and the providing of adequate and reliable facilities for inspection and testing of lines and apparatus; reporting, recording and summarizing troubles in such a manner as to obtain accurate, uniform reports from which fair comparison may be made both as to the kinds of trouble, their causes, and the expense involved in locating and clearing them. There should be more careful study on the part of the manufacturers of apparatus of the conditions of service under which the apparatus must operate.

J. A. Kick said that the original installations were often so expensive to maintain that it was found profitable to entirely

rewire and rearrange the equipment so that it could be properly and promptly tested, inspected and repaired. In many telephone circuits hastily built it was later found that maintenance was prohibitive; and after a more extended experience with the class of equipment used, the methods of installation in their relation to maintenance were more carefully considered. Regardless of the probable final results maintenance is an unsolved problem until the ratio between cost and efficiency is known and its desirable percentage levels fixed.

A paper on unit costs of railroad pole line construction and repairs, by V. T. Kissinger (Chicago, Burlington & Quincy), was read by W. P. Cline. Mr. Kissinger told of his successful experience in using piece work rates for this kind of work. Every job done under this system has been finished at a considerable saving under former costs, yet with an increase in the earnings of the men of about 25 per cent. Additional supervision is necessary, but the results have been satisfactory and the quality of the work has been improved. Piece work jobs have been done successfully, not only on level ground, but in the Black Hills country, where it is rough and rocky.

SECOND DAY

The first paper read on Wednesday was one by J. C. Hubbard, general supervisor of lines of the Western Union Telegraph Company, New York City, on the organization of forces for restoring wires broken down by storms. Mr. Hubbard's paper fills 32 pages of the program of the meeting. He takes up in detail the duties of the railroad superintendent of telegraph and says that if he succeeds in pleasing his two bosses, the railroad company and the telegraph company, he is fit to be classed as a diplomat. An essential element in quickly restoring interrupted wire service is a carefully laid out plan for complete records and reports. He gives sample pages of notebooks to be carried by line men, and a large diagram on which the foreman or superintendent should keep a graphic record of everything that is done on the road.

J. B. Sheldon (Union Pacific) read a paper on the fitting of applicants for telegraph and telephone service, which is reprinted, in part, in another column. In the discussion L. M. Jones (A. T. & S. F.) said that his company maintained two schools. He discouraged the teaching of girls because it was hard to place them. The best material for operators, he said, came from the farms. W. H. Hall (M. K. & T.) believed in assisting the young students and operators in every way and taking a personal interest in them, so as to make them satisfied with their work. He knew of many cases of discouragement through the attitude of the agent or the division operator toward them. If courtesy be expected from employees courtesy must be extended to them.

W. J. Camp (Canadian Pacific) told of the efforts of the representatives of the men to have the Canadian Railway Commission make the age limit of employment 21 years instead of eighteen, but the commission refused to make the change.

A paper on wireless telegraphy in railroad service, by L. B. Foley of the Lackawanna, was read by President William Bennett. Mr. Foley told of his recent experiments, with which the readers of the *Railway Age Gazette* are already familiar. E. A. Chenery (Missouri Pacific) opened the discussion. Wireless telegraph, he said, was hard to discuss in a "safe and sane" manner. It appeals too much to the imagination and arouses an enthusiasm that is apt to lead one astray. Would the expense of maintaining a wireless system in addition to the wire plant be justified by its use to bridge over a single storm break in twelve months? Mr. Foley's steel towers must have cost considerable money. Would not an equivalent amount of money spent on his wire plant do much greater good in lessening the duration of storm interruptions and giving better all-year-round service? Mr. Foley deserved unqualified praise for his pioneer work in wireless telegraphy, but discussion should be encouraged so as to get the truth in the exploitation of this new art.

David Sarnoff (Marconi Wireless Telegraph Company) spoke

in defense of the wireless system and answered questions brought up by Mr. Chenery. He explained in detail how interference is prevented when two or more stations are transmitting at the same time, citing cases where this is constantly being done. He said that wireless will be of inestimable value to railroads as an auxiliary means of communication. While wireless communication with moving trains was practicable he felt that its greatest utility on railroads at the present time is perhaps in the way of fixed stations which are ever ready to be put in operation when all other means of communication fail. The Marconi Company seeks no immediate profit; that is to say, the apparatus is not sold outright to the steamship owners or railway people, but his company designs and furnishes the apparatus at its own expense, charging the users a rental for which the lessee enjoys the advantages of all additional improvements in the art. Further, the Marconi Company maintains the apparatus and makes repairs when necessary. Such an organization has made possible the present entirely practicable means of radio communication at sea, and the same Marconi organization will make possible reliable radio communication over land, regardless of the number of wireless stations that may be erected within a given territory.

H. M. Horton, of the Radio Telephone and Telegraph Company, New York, described the De Forest audion amplifier and showed one of the instruments.

THIRD DAY

At the session of Thursday morning A. Wray (C. R. I., & P.) read a paper on the use of the printer telegraph on railroads. Mr. Wray gave a brief historical sketch of the use of printing telegraphs in England, France and America, and followed this with an account of the experiences of his road with the Morkrum apparatus. Good results with this apparatus are reported, not only on the Rock Island, but also on the Lake Shore & Michigan Southern and the Chicago, Burlington & Quincy. The Rock Island, unlike the other two companies, uses a tape transmitting machine, with which the messages can be punched in paper tape beforehand, thus economizing time on the wire. In case a wire is interrupted, the punching of the messages can go on, nevertheless, and the messages be ready to send when the wire is restored. On a line between Chicago and Topeka, an average of 816 messages was transmitted daily for one week. This line is 586 miles long. With two repeaters the Rock Island uses this apparatus on a circuit 899 miles long. The roads named do not own the apparatus, payments to the maker being made in the shape of rental. Out of 20 girls employed on the Rock Island to run these machines, only two had had previous experience as typewriter operators. On the Rock Island, many messages are written, and received, on printed report-blanks and it is practicable to use any form that can be used on a typewriter. A code of flashlight signals has been devised by which the sending operator tells the receiving operator the kind of blank to be used for each message. With printing telegraph apparatus it is necessary to have careful supervision by a competent attendant, and local circuits for the printer have to be provided at a potential other than that readily obtained from ordinary telegraph generator plants; but, on the other hand, there is the advantage of the more rapid transmission and the lower cost per message.

This paper gave rise to a lengthy and interesting discussion. W. J. Camp (C. P.) had tried various printing telegraphs with satisfactory results. He described two printer circuits now being operated between Montreal and Toronto, one between Montreal and Quebec and one between Montreal and Ottawa.

J. O. Carr described the Morkrum printer. H. A. Emmons (Western Union) said that it was not difficult for women operators to transmit sixty messages an hour on the keyboard typewriter after three or four months' training. There were women operators who can handle 100 messages an hour for nine hours a day. There is a difference of from twenty-five to forty per cent. between the direct keyboard and tape transmission.

G. H. Groce told of his efforts to find a printer specially adapted to railroad work and described a machine based upon

the Wright instrument, now being made for him by the Union Switch & Signal Company. It transmits on the Baudot principle. A circuit equipped with these machines is now being operated on the Illinois Central road between Memphis and New Orleans. During a visit to Europe he found that 4,000 printers of one make were in use in Germany.

M. H. Clapp presented a paper on "Physical and Phantom Transposition." Resolutions were also passed on the deaths of three members during the year.

Rochester, N. Y., June 22 to 25, 1915, were selected as the place and time for the next annual convention. The election of officers resulted as follows:

President, W. C. Walstrum (Norfolk & Western), Roanoke, Va.; first vice-president, E. C. Keenan, New York Central Lines, West, Chicago, Ill.; second vice-president, L. S. Wells, Long Island, New York City; secretary and treasurer, P. W. Drew (M. St. P. & S. S. M.), Chicago, Ill.; chairman of the Eastern Division, W. H. Potter (Southern), Washington, D. C., chairman of the Western Division, M. H. Clapp (Northern Pacific), St. Paul, Minn.

NEW M. K. & T. STATION AT HOUSTON, TEX.

The new passenger station of the Missouri, Kansas & Texas, of Texas, recently completed at Houston, is located about four blocks from the business center of the city on the banks of White Oak bayou, at the intersection of Main street. The railway company has built a lateral viaduct 120

floors are of reinforced concrete supported by steel girders and columns. The roof is of tar and gravel laid on a 3 in. concrete slab, the whole being supported by steel trusses 40 ft. in length.

The viaduct entrance leads into a waiting room 75 ft. long by 40 ft. wide on the second floor. The ladies' rest room, the telegraph office and two small offices are also situated on the second floor. A wide double flight of stairs leads from this waiting room to the white waiting room below. Between these stairs on the ground floor is the news stand, check counter, etc. In the extreme west end of the main building, below the ladies' rest room, is the negro waiting room. Between the latter and the white waiting room are the ticket offices, making them easily accessible from both sides. The left of west wing is used entirely by the dining department; for white and negro lunch rooms, kitchen, storeroom and refrigerator rooms. In the east end of the main building proper is the baggage room, and the express room is under the viaduct. These are on the level of the platform and have openings to the track side and on Girard street. A baggage elevator runs from the baggage room to the viaduct above.

The floors are covered with gray tile, and the wainscoting is of green ceramic tile. All openings are cased in quarter sawed oak, highly polished and finished in Old English. The seats are of the same material and finished to match. The lunch counters are finished with ceramic tile, with a 2 in. mahogany top 30 in. wide. The main stairs are of gray Georgia marble, fitted with brass safety treads. The ceilings of the waiting rooms are paneled with heavy beams of steel encased



Missouri, Kansas & Texas Station at Houston, Texas

ft. long connecting the Main street viaduct, over which several car lines pass, with the second floor of this station, thus making it easily accessible to pedestrians, vehicles and passengers of the street railway, while the front or Girard street entrance is on the ground floor.

The building is 186 ft. long and consists of a main or central portion 100 ft. x 40 ft., two stories high with a three-story clock tower, a left wing 60 ft. x 33 ft. of one story and a basement, and an express room 53 ft. x 40 ft. under the viaduct. This structure is fireproof throughout. The exterior walls are of reddish brown brick, and laid in an extra wide steel gray mortar joint, with stone and terra cotta trimmings. The interior partitions are of fireproof tile blocks. The rough

in concrete and covered in ornamental plaster. A semi-indirect system of lighting is used.

There are two tracks in the rear of the depot, passing diagonally across the station grounds. About 450 ft. of butterfly train sheds are provided along the track, and a covered way extends from the track side entrance of the white waiting room to the train shed. A copper marquise runs from the left wing to the baggage room and with train sheds and covered way provides adequate shelter for all passengers.

The plans and specifications were prepared under the direction of the chief engineer of the railway, and the building was constructed under his supervision.

FREIGHT CLAIM ASSOCIATION

The twenty-third annual meeting of the Freight Claim Association was held at Galveston, Texas, May 13, 14 and 15, President G. W. Perry (Great Northern) in the chair.

President Perry made a brief address reviewing the work of the association during the past year. Twenty-seven new members have joined, showing that the short roads find it advantageous to be connected with the association. The Conference Committee has co-operated with the Interstate Commerce Commission in action looking to the securing of statistics of claims, showing with what degree of promptness they are considered and paid. The standard forms for the presentation of freight claims have received general approval.

Mr. Perry referred to the waste of work in preparing claims. At least half the papers in a file usually will be found to be not only useless, but productive of confusion. Printed forms are of doubtful utility. Information cannot be obtained by machinery. Human intelligence must be used to make a profitable correspondence. The Appeal Committee has received during the past year only 156 claims, showing that the vast number of interline loss and damage claims, amounting probably to a million a year, have been settled almost invariably without friction. Only 658 have been placed in arbitration.

Mr. Perry cited the opinions of general managers and others that the Freight Claim Association is the strongest of all railroad organizations. Its constitution and rules are mandatory, an element which is of great value. Except for this, the situation as respects freight claims would be chaotic. There is a sentiment among managers, superintendents and others that this association ought to be enlarged so as to consider not only the settlement of freight claims, but the prevention of claims, and later in the meeting the committee on constitution and by-laws made a report recommending that the scope of the work of the association be enlarged so as to include the study of causes and the prevention of freight claims. This recommendation was adopted and there will be a new committee, known as the Committee on Cause and Prevention.

The secretary reported 157 members present or represented by proxy. The membership of the association at the present time is 426, representing over 261,000 miles of road.

It was resolved that decisions of the Appeal Committee be published only in such cases as the chairman of the committee should so decide. This will avoid the expense and work of publishing opinions which cover points already settled.

The Committee on Methods and Topics made a report dealing with many subjects. These were referred to the new committees and embraced the following:

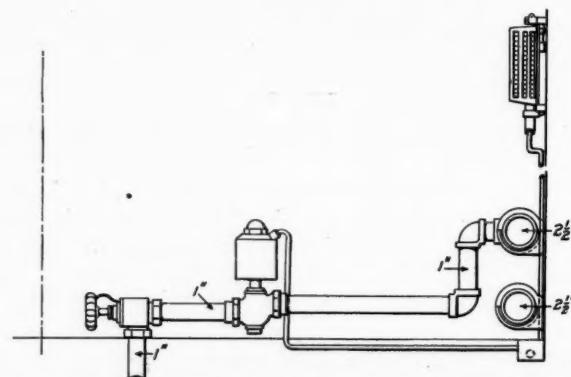
Stamping L. C. L. package freight; cancellation of internal revenue tax; forms used in handling overcharge claims; overcharge distribution statement—form proposed by western lines; marking freight with shipper's name and address; method of requesting disposition of freight; showing weight on shipping orders; concealed loss and damage; section 3, uniform bill of lading; showing causes and commodities on loss and damage distribution statements; securing information from other than freight claim officials; end doors; use of stamp for showing transfer exceptions; uniform practice to be observed for returning claim papers to official of paying carrier; prevention of loss and damage claims; receiving, billing, loading, handling and delivering freight; astray freight; defective equipment; disposition of refused and unclaimed freight, and locating individual responsibility.

It was voted that the next meeting be held in Chicago, June 16, 1915. The election of officers for the ensuing year resulted as follows: President, J. W. Newell (C. B. & Q.); first vice-president, E. Arnold (G. T. Ry.); second vice-president, W. O. Bunger (C. R. I. & P.); secretary and treas-

urer, Warren P. Taylor (R. F. & P.), Richmond, Va. The chairmen of the three arbitration committees are, respectively, G. C. Arnold (Lehigh Valley), R. K. Slaughter (A. B. & A.) and J. M. Eedson (Mich. Cent.). The chairman of the Appeal Committee is J. J. Hooper (Southern). The Conference Committee was continued, with the same powers as heretofore.

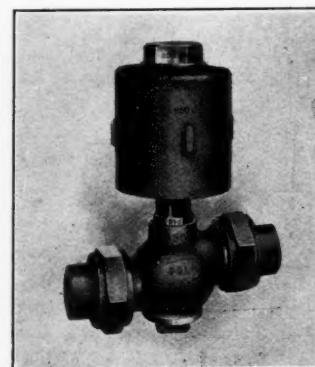
ELECTRIC THERMOSTATIC CONTROL OF STEAM HEATING

A system of automatically controlling the temperature in a passenger train car from the inside has been developed by the Gold Car Heating and Lighting Company, 17 Battery Place, New York, and is known as electric thermostatic control. It

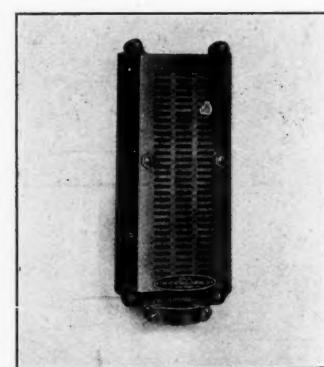


Application of Electric Thermostatic Control to a Passenger Train Car

is claimed that the apparatus will practically hold the temperature in the car constant. The system includes two special devices, an electric thermostat operating contacts by the expan-



Electro-Magnetic Valve



Electric Thermostat

sion and contraction of a temperature-sensitive diaphragm and an electro-magnetic valve. The lowering in the car temperature by changes in the weather causes the thermostat to open the valve and the warming of the car will operate to close the valve. The thermostat is usually placed in a convenient location on the wall near the middle of the car and the electro-magnetic valves are placed in the cross-over pipes on each side of the car underneath a seat, the three being connected by electric wires conveniently placed. The electro-magnetic valve is normally open. The electric current is very small and is obtained from the electric lighting circuit. It is claimed that there is a considerable saving in steam accomplished by the use of this system, either in connection with straight steam or with plain vapor systems. It is said that in the heating of cars in terminal yards tests have shown a saving of from 50 per cent. to 75 per cent.

General News Department

The Chicago & North Western has abandoned the use of perforating ticket dater.

The Chicago & Alton will appeal to the United States Supreme Court in the suit, recently reversed by the Court of Claims, changing the basis for calculating the weight of the mails in connection with fixing the annual compensation to be paid the railroads for transportation. A large number of railroads are interested in the outcome of this suit, and it is said that, if the railroad should win its case, claims of many millions of dollars would be made against the government.

A controversy between the Chicago railways and yardmen employed in the Chicago switching district, involving interpretations of some of the rules regarding working conditions provided in a contract of April 17, 1913, was settled on Monday, May 25, by the acceptance by the men of a compromise on the points in dispute offered by the roads. This followed several meetings between a conference committee of general managers and representatives of the Brotherhood of Railway Trainmen. The yardmen had voted to strike unless the matters were adjusted to their satisfaction.

Marcus A. Dow, general safety agent of the New York Central lines, reports that, as a result of the vigorous campaign which has been conducted on the New York Central, the number of trespassers killed on the tracks of that company in seven months ending April 30 was 38 less than in the same period one year ago; 98 this year and 136 last year. The number of trespassers injured has also fallen off. It has been noticed that fewer persons walk on the tracks in the manufacturing districts where men and women going to and from shops have habitually walked on the railroad right of way. Mr. Dow reports a growing tendency among the judges and magistrates to punish such offenders.

The relief department of the Chicago, Burlington & Quincy has issued its twenty-fifth annual report covering the year ending December 31, 1913. The receipts for the year were \$619,958, of which \$580,388 represented contributions of members; \$20,625 income from investments, and \$18,944 cash advanced by the railroad. Benefit orders to the amount of \$616,905 were cashed by the treasurer. From June 1, 1889, to December 31, 1913, the relief department has paid out in benefit orders on account of sickness or accidents a total of \$9,451,300. The total payments by the railroad company from its own funds in establishing, operating and maintaining the relief department from 1889 to 1913, inclusive, have amounted to \$1,679,437.

Rail Failures in New York State

The New York State Public Service Commission, Second district, reports that the number of rail failures reported to it for the first three months of each year since 1904 has been as follows:

1905.....	1,331	1910.....	1,640
1906.....	826	1911.....	1,456
1907.....	3,014	1912.....	3,580
1908.....	3,408	1913.....	1,122
1909.....	1,280	1914.....	1,724

A comparison by months for the past three years shows the following results for the first three months of each year:

	1914	1913	1912
January	390	347	1,283
February	734	391	1,124
March	600	384	1,173
	1,724	1,122	3,580

The effect of the severe winter of 1912 on rail breakages is well known. The statistics here presented apparently show that there has been much improvement in the steel now used in rails within the state of New York, for under winter conditions which were quite as severe as those of 1912, the breakages were about 50 per cent. of those of that year, and only about 50 per cent. in excess of those of 1913, which was a very mild winter.

Safety-First Placards

The Southern Pacific is posting in conspicuous places along its lines large placards displaying the following:

"We solicit your co-operation in preventing death and injury to yourself, our patrons and the community at large. Stop to look and listen before passing over railway grade crossings. Refrain from and discourage trespassing upon railroad property. Be careful when waiting for trains or using the company's facilities.

"It is not safe to start over a railway crossing without first stopping to look and listen, to get on or off trains while in motion, to stand near edge of platform when trains are passing, to cross over ahead of an approaching train, or pass closely behind a train standing, to stand or walk upon tracks around stations or elsewhere, to allow children to play around the station, tracks and cars." Then follow some figures regarding trespassing and grade crossing accidents.

Summary of Revenue and Expenses of Steam Roads in March

The Bureau of Railway Economics' summary of revenues and expenses and comments thereon for March, 1914, are as follows: Railways operating 225,635 miles of line are covered by this summary, or about 90 per cent. of all steam railway mileage in the United States. Their operating revenues for the month of March, 1914, amounted to \$242,832,681. This amount includes revenues from freight and passenger traffic, from carrying mail and express, and from miscellaneous sources connected with rail operation. Compared with March, 1913, total operating revenues show an increase of \$692,970, but this increase is due to increase in mileage. Reduced to a per mile of line basis, total operating revenues per mile averaged \$1,076 in March, 1914, and \$1,081 in March, 1913, a decrease of \$5, or 0.5 per cent. There was an increase of 1.4 per cent. in freight revenue per mile, while passenger revenue per mile decreased 5.9 per cent.

Operating expenses, which include all the costs of maintaining track and equipment, operating trains, securing traffic, and of administration, amounted to \$176,533,271. This was \$2,445,075 less than for March, 1913. These operating expenses per mile of line averaged \$782 in March, 1914, and \$799 in March, 1913, a decrease of \$17 per mile, or 2.1 per cent.

Net operating revenue, that is, total operating revenues less operating expenses, amounted to \$66,299,410, which was \$3,138,045 greater than for March, 1913. Net operating revenue per mile of line averaged \$294 in March, 1914, and \$282 in March, 1913, an increase of \$12 per mile, or 4.2 per cent.

Taxes for the month of March amounted to \$11,319,304, or \$50 per mile, an increase of 8.8 per cent. over March, 1913.

Operating income, which is net revenue from rail and auxiliary operations, less taxes, averaged \$242 per mile of line, and in March, 1913, \$235, thus increasing \$7, or 2.9 per cent. Operating income for each mile of line for each day in March averaged \$7.79, and for March, 1913, \$7.57. Operating income is that proportion of their operating receipts which remains available to the railways for rentals, interest on bonds, appropriations for betterments, improvements, new construction, and dividends.

The operating ratio for March, that is, the per cent. of total operating revenues absorbed in operating expenses, was 72.7 per cent., which is comparable with 73.9 per cent. in March, 1913, and 71.0 per cent. in March, 1912.

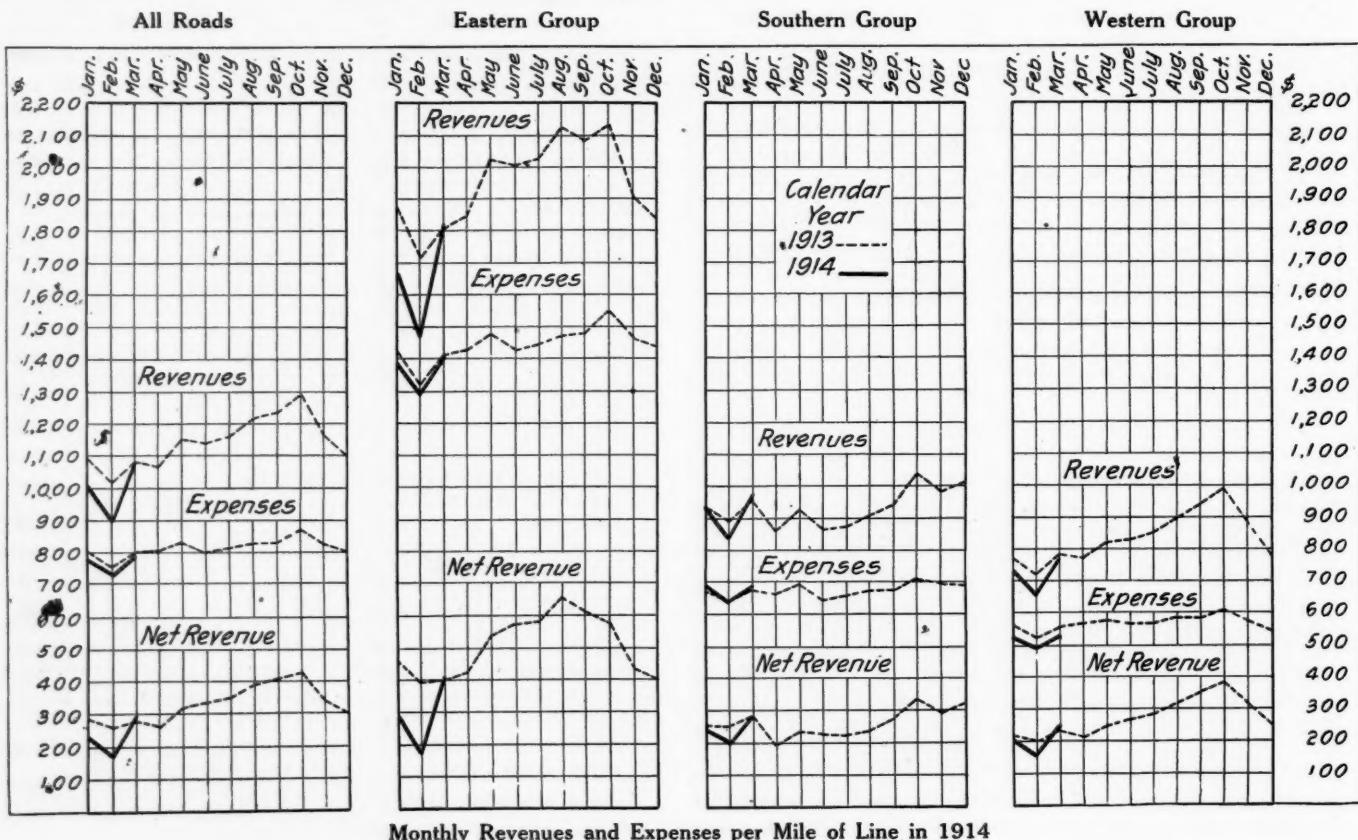
The railways of the eastern district show an increase in total operating revenues per mile of line as compared with March, 1913, of 0.2 per cent., the railways of the southern district an increase of 1.9 per cent., and the railways of the western district a decrease of 1.8 per cent. Operating expenses per mile decreased 0.6 per cent. in the East, increased 1.7 per cent. in the South, and decreased 5.1 per cent. in the West. Net operating revenue per mile increased 2.7 per cent. in the East, increased 2.6 per cent. in the South, and increased 6.3 per cent. in the West. Taxes per mile show an increase of 3.0 per cent. in the

East, an increase of 18.3 per cent. in the South, and an increase of 12.0 per cent. in the West. Operating income per mile increased 2.1 per cent. in the East, increased 0.5 per cent. in the South, and increased 4.9 per cent. in the West.

Comparison of returns for nine months of the current fiscal year with those of the corresponding months of the previous fiscal year reveals a decrease in total operating revenues per mile of 2.3 per cent., an increase in operating expenses per mile of 2.4 per cent., and a decrease in net operating revenue per mile of 12.4 per cent. This net operating revenue per mile decreased 20.4 per cent. in the East as compared with the corresponding period of the previous year, decreased 0.8 per cent. in the South, and decreased 8.5 per cent. in the West.

When the returns for the three months of the calendar year 1914 are compared with those of the corresponding months of 1913, they show a decrease in total operating revenues per mile of 6.2 per cent., a decrease in operating expenses per mile of 2.8 per cent., and a decrease in net operating revenue per mile of 15.9 per cent. This net operating revenue per mile decreased 30.8 per cent. in the East as compared with the corresponding period of the previous year, decreased 7.0 per cent. in the South, and decreased 5.8 per cent. in the West.

The diagram shows the variations in operating revenues, oper-



Monthly Revenues and Expenses per Mile of Line in 1914

ating expenses, and net operating revenue per mile for the separate months of the calendar year 1913 and of the calendar year 1914 to date. The following table shows the per cent. of operating revenues consumed by each class of expenses:

PER CENT OF TOTAL OPERATING REVENUES

	March		Fiscal year ending June 30		Nine months ending March 31	
	1914	1913	1913	1912	1914	1913
Freight revenue	71.8	70.5	69.8	68.7	69.1	69.9
Passenger revenue	20.3	21.4	22.2	23.2	22.8	22.2
Other transportation	6.9	7.1	6.9	7.1	7.0	6.8
Non-transportation	1.0	1.0	1.1	1.0	1.1	1.1
Maintenance of way and structures	11.6	12.7	13.3	12.7	13.1	12.7
Maintenance of equipment	17.9	17.7	16.4	15.9	17.4	16.2
Traffic expenses	2.1	2.2	2.0	2.1	2.1	2.0
Transportation expenses	38.3	38.7	35.2	35.9	36.3	35.0
General expenses	2.8	2.6	2.4	2.5	2.6	2.3
Total operating expenses (excluding outside operations and taxes)	72.7	73.9	69.3	69.1	71.5	68.2

Automatic Electric Company, Chicago. Automatic switchboard and telephones. Telephone train despatching equipment with new calling apparatus; musolophone or loud speaking telephone. The company was represented by E. Keith, J. H. Finley and C. M. Sells.

Hall Switch & Signal Company; W. E. Harkness and Edw. E. Backus. Gill and Sandwich selective train despatching devices.

J. H. Bunnell & Co., New York; J. J. Ghegan, president. "Battery kick-off," a new device, which, when placed on leaky telegraph lines at terminal or battery stations, causes the ordinary instruments in way or intermediate offices to respond to every signal from any office on the line, provided the instruments at the terminal or battery stations are in adjustment.

Brookfield Glass Company, New York; Arthur Lockwood, secretary.

Radio Telephone and Telegraph Company, New York; H. M. Horton. De Forest audion detector.

The Morkrum Company, Chicago; J. O. Carr.

The Gordon Primary Battery Company, New York; G. A. Nelson.

Hubbard & Co., Pittsburgh, Pa.; Victor L. Crawford.

G. H. Groce took several parties of superintendents to the Illinois Central station to witness the operation of his printing telegraph system work-

ing duplex between New Orleans and Memphis, Tenn., a distance of 400 miles.

Charles K. Jones, Kansas City, Mo. A new polarized relay with double armatures.

Railway Development Association

The annual convention of the Railway Development Association was held at the Jefferson Hotel, St. Louis, Mo., on May 12. The program included reports of committees on the adoption of uniform side track contracts and uniform lease of property, followed by open discussion on the "Value of the County Agent," by T. R. Haverstad, agricultural commissioner, Minneapolis, St. Paul & Sault Ste. Marie; "Co-operation Between Towns and Rural Communities," by H. M. Cottrell, agricultural commissioner, Chicago, Rock Island & Pacific; "Co-operation Between the Transportation Companies and Communities in Building Public Highways," by G. A. Parks, general industrial and agricultural agent, Louisville & Nashville; "Immigration," by S. A. Hughes, general immigration agent, St. Louis & San Francisco, and F. H. LaBaume, agricultural and industrial agent, Norfolk & Western; "Advertising," by Rutledge Smith, general agent, Tennessee Central; and M. V. Richards, land and industrial agent, Southern Railway; "Value of Personal Solicitation in Securing Industries," by D. E. King, industrial commissioner, Missouri Pacific, and H. O. Hartzell, assistant general industrial agent, Baltimore & Ohio. The annual dinner was held in the evening, at which addresses were made by C. N. Whitehead, vice-president, Missouri, Kansas & Texas; C. W. Simmons, vice-president, Simmons Hardware Company, St. Louis; A. F. Versen, industrial commissioner, St. Louis Business Men's League, and J. F. Jarrell, publicity agent, Atchison, Topeka & Santa Fe. F. H. LaBaume, agricultural and industrial agent of the Norfolk & Western, Norfolk, Va., was elected president, and it was decided to hold the 1915 convention in Chicago.

The Traveling Engineers' Association

The twenty-second annual convention of the Traveling Engineers' Association will be held at the Hotel Sherman, Chicago, commencing at 10 a. m. Tuesday, September 15, and continuing four days. The subjects to be discussed at this year's meeting are as follows: "Difficulties accompanying the prevention of dense black smoke and its relation to the cost of locomotive repairs and fuel," Martin Whalen, chairman; "Operation of all locomotives with a view of obtaining maximum efficiency at lowest cost," J. R. Scott, chairman; "Advantage to be derived from the use of mechanical stokers, considering (1) increased efficiency of the locomotive; (2) increasing the possibility of securing a higher type of candidates for the position of firemen; (3) the utilization of cheaper grades of fuel," J. H. DeSalis, chairman; "The care of locomotive brake equipment on the road and at terminals; Methods of locating and reporting defects," George H. Wood, chairman; "Advantage derived from the use of speed recorders and their influence on operating expense," Fred Kerby, chairman; "Practical chemistry of combustion," A. G. Kinyon; "Scientific train loading; Tonnage rating. The best method of obtaining maximum tonnage haul for the engine over the entire division, taking into consideration the grades at different points on the division," O. S. Beyer, Jr.

American Association of Railroad Superintendents

At a meeting of the executive committee of the American Association of Railroad Superintendents in St. Louis on May 20, it was decided to hold the 1914 annual convention in New York City on August 20 and 21. All of the committees of the association, including the executive committee and the transportation, train rules, interchange car inspection, arbitration, nominations, membership, arrangements, resolutions and auditing committees, have been filled by active workers nominated by the general managers of the railroads represented, and it is expected that the meeting will be the most successful in the history of the association.

Association of Transportation and Car Accounting Officers

The summer meeting of the Association of Transportation and Car Accounting Officers will be held at the Hotel Chalfont, Atlantic City, N. J., on June 18 and 19. Committee reports will be presented on the following subjects: Car Service, Office Methods

and Accounting, Handling Railroad Business Mail, Conducting Freight Transportation, Conducting Passenger Transportation, and Joint Interchange and Inspection Bureaus. A cordial invitation is extended to all railway officers interested in transportation, car service and car accounting subjects to be present.

Western Railway Club

At the annual meeting of the Western Railway Club in Chicago the election of officers resulted as follows: President, E. W. Pratt, Chicago & North Western; first vice-president, H. H. Harvey, Chicago, Burlington & Quincy; second vice-president, J. H. Tinker, Chicago & Eastern Illinois; and secretary and treasurer, J. W. Taylor.

American Society for Testing Materials

The seventeenth annual meeting of the American Society for Testing Materials will be held at the Hotel Traymore, Atlantic City, N. J., June 30-July 3. The program is divided into sessions on non-ferrous materials, steel, cement and concrete, lime, ceramics and road materials, preservative coatings and testing apparatus and methods.

MEETINGS AND CONVENTIONS

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass.

AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Boston, Mass.

AMERICAN ASSOCIATION OF DINING CAR SUPERINTENDENTS.—H. C. Boardman, D. L. & W., Hoboken, N. J. Next convention, October, Washington.

AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.—W. C. Hope, 143 Liberty St., New York.

AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, I. C. R. R., East St. Louis, Ill.

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—E. H. Harman, Room 101, Union Station, St. Louis, Mo. Next convention, August 20 and 21, New York.

AMERICAN ELECTRIC RAILWAY ASSOCIATION.—E. B. Burritt, 29 W. 39th St., New York. Annual convention, October 12-16, Atlantic City, N. J.

AMERICAN ELECTRIC RAILWAY MANUFACTURERS' ASSOC.—H. G. McConaughay, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.

AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichy, C. & N. W., Chicago. Next convention, October 20-22, 1914, Los Angeles, Cal.

AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, 900 S. Michigan Ave., Chicago. Next convention, March 16-18, 1915.

AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, Karpen Building, Chicago. June 15-17, Atlantic City, N. J.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—A. R. Davis, Central of Georgia, Macon, Ga. Next convention, July 20-22, Hotel Sherman, Chicago.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa. Next annual meeting, June 30 to July 4, Hotel Traymore, Atlantic City, N. J.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—Chas. W. Hunt, 220 West 57th St., New York; 1st and 3d Wed., except June, July and August, New York. Annual convention, June 2-5, Baltimore, Md.

AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—J. R. Wemlinger, 11 Broadway, New York; 2d Thursday of each month, at 2 P. M., 11 Broadway, New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York. June 16-19, St. Paul-Minneapolis, Minn.

AMERICAN WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, B. & O., Baltimore, Md. Next convention, January 19-21, 1915, Chicago.

ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—E. R. Woodson, 1300 Pennsylvania Ave., Washington, D. C. Annual meeting, June 24, Minneapolis, Minn.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—C. W. Egan, B. & O., Baltimore, Md.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreuccetti, C. & N. W., Ry., Chicago. Semi-annual meeting, June 12, Hotel Denis, Atlantic City, N. J. Annual convention, October 19-23, Chicago.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, 112 West Adams St., Chicago.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York. Annual meeting, Hotel Chalfont, Atlantic City, N. J., June 18-19.

ASSOCIATION OF WATER LINE ACCOUNTING OFFICERS.—W. R. Evans, Chamber of Commerce, Buffalo, N. Y.

BRIDGE AND BUILDING SUPPLY MEN'S ASSOCIATION.—L. D. Mitchell, Detroit Graphite Co., Chicago, Ill. Meeting with American Railway Bridge and Building Association.

CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 176 Mansfield St., Montreal, Que.; 1st Thursday, October, November, December, February, March and April, Montreal.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Lawler Ave., Chicago; 2d Monday in month, except July and August, Lytton Bldg., Chicago.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Fri. in Jan., May, Sept. and Nov. and 2d Thurs. in March, Hotel Statler, Buffalo, N. Y.

CIVIL ENGINEERS' SOCIETY OF ST. PAUL.—Edw. J. Dugan, P. O. Box 654, St. Paul, Minn.; 2d Monday, except June, July, August and September, Old State Capitol Bldg., St. Paul.

ENGINEERS' SOCIETY OF PENNSYLVANIA.—Edw. R. Dasher, Box 75, Harrisburg, Pa.; 1st Friday after 10th of each month, except July and August, 31 So. Front St., Harrisburg, Pa.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—Elmer K. Hiles, Oliver Bldg., Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Richmond, Va.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—A. M. Hunter, 605 Grand Central Station, Chicago; Wed. preceding 3d Thurs., Transportation Bldg., Chicago.

INTERNATIONAL RAILWAY CONGRESS.—Executive Committee, 11, rue de Louvain, Brussels, Belgium. Convention, 1915, Berlin.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—C. G. Hall, 922 McCormick Bldg., Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—Wm. Hall, 829 West Broadway, Winona, Minn. Next convention, July 14-17, Hotel Sherman, Chicago.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, Lima, Ohio. Next convention, third Tuesday in August.

MAINTENANCE OF WAY MASTER PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—T. I. Goodwin, C. R. I. & P., Eldon, Mo. Next convention, November 17-19, 1914, Detroit, Mich.

MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Karpen Building, Chicago. June 10-12, Atlantic City, N. J.

MASTER CAR & LOCOMOTIVE PAINTERS' ASSOC. OF U. S. AND CANADA.—A. P. Dane, B. & M., Reading, Mass. Next convention, September 8-11, Nashville, Tenn.

NATIONAL RAILWAY APPLIANCES ASSOCIATION.—Bruce V. Crandall, 537 So. Dearborn St. Chicago. Next convention, March 15 to 19, 1915, Chicago.

NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings monthly.

PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, Union Station, Peoria, Ill.; 2d Thursday in month, Jefferson Hotel, Peoria.

RAILROAD CLUB OF KANSAS CITY.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

RAILROAD MASTER TINNERS, COPPERSMITHS & PIPEFITTERS' ASSOCIATION.—U. G. Thompson, C. & E. I., Danville, Ill.

RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 30 Church St. New York.

RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

RAILWAY DEVELOPMENT ASSOCIATION.—W. Nicholson, Kansas City Southern, Kansas City, Mo.

RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOC.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.

RAILWAY FIRE PROTECTION ASSOCIATION.—C. B. Edwards, Mobile & Ohio, Mobile, Ala. Annual meeting, 1st Tuesday in October.

RAILWAY GARDENING ASSOCIATION.—J. S. Butterfield, Lee's Summit, Mo.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Bethlehem, Pa. Annual meeting, Bluff Point, N. Y., September 22-24.

RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio.

RAILWAY SUPPLY MANUFACTURERS' ASSOCIATION.—J. D. Conway, 2136 Oliver Bldg., Pittsburgh, Pa. Meetings with M. C. B. and M. M. Associations. Atlantic City, June 10 to 17.

RAILWAY TELEGRAPH & TELEPHONE APPLIANCE ASSOCIATION.—G. A. Nelson, 50 Church St., New York. Meetings with Assoc. of Ry. Teleg. Supts.

RICHMOND RAILROAD CLUB.—F. O. Robinson, C. & O., Richmond, Va.; 2d Monday in month, except June, July and August.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. W., Sterling, Ill. Next convention, September 8-10, 1914, Chicago.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

SALT LAKE CITY TRANSPORTATION CLUB.—R. E. Rowland, Hotel Utah Bldg., Salt Lake City, Utah; 1st Saturday of each month, Salt Lake City.

SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmunds, 3868 Park Ave., New York. Meeting with annual convention Railway Signal Association.

SOCIETY OF RAILWAY FINANCIAL OFFICERS.—Carl Nyquist, La Salle St. Station, Chicago.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. Ry., Atlanta, Ga. Next meeting, July 16, Chattanooga, Tenn.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant Bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., 10 A. M., Candler Bldg., Atlanta.

TOLEDO TRANSPORTATION CLUB.—J. S. Marks, Agent, Interstate Despatch, Toledo, Ohio; 1st Saturday in month, Boody House, Toledo.

TRACK SUPPLY ASSOCIATION.—W. C. Kidd, Ramapo Iron Works, Hillsburn, N. Y. Meetings with Roadmasters' and Maintenance of Way Association.

TRAFFIC CLUB OF CHICAGO.—W. H. Wharton, La Salle Hotel, Chicago.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 291 Broadway, New York; last Tuesday in month, except June, July and August, Waldorf-Astoria, New York.

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Erie R. R., Pittsburgh, Pa.; meetings bimonthly, Pittsburgh. Annual meeting, 2d Monday in June.

TRAFFIC CLUB OF ST. LOUIS.—A. F. Versen, Mercantile Library Building, St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.

TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7122 Stewart Ave., Chicago. Next convention, June 16, Jacksonville, Fla.

TRANSPORTATION CLUB OF BUFFALO.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Supt.'s office, L. S. & M. S., Detroit, Mich.; meetings monthly, Normandie Hotel, Detroit.

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y. Next meeting, September 15-18, Hotel Sherman, Chicago.

UTAH SOCIETY OF ENGINEERS.—Frank W. Moore, Newhouse Bldg., Salt Lake City, Utah; 3d Friday of each month, except July and August, Consolidated Music Hall, Salt Lake City.

WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, 1112 Karpen Building, Chicago; 3d Tuesday of each month, except June, July and August, Karpen Building, Chicago.

WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago; regular meeting 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings.

Traffic News

The effective date of the spotting tariffs recently filed by the eastern roads has been postponed from May 27 to July 1.

A press despatch from Brownsville, Tex., says that, after a suspension of a year, freight is beginning to move across the International bridge between Brownsville and Matamoras.

The New Orleans, Texas & Mexico, now in the hands of a receiver, announces that, beginning June 1, a through passenger train will be run each way, daily, in the day time, between Houston and New Orleans; and the present through night train will be run a little faster than now.

The Trans-Missouri Freight Bureau is working out a tentative readjustment of freight rates for the Trans-Missouri territory as a substitute for rates to Colorado and Utah points named in a recent decision of the Interstate Commerce Commission. The rates are being worked out on a percentage basis, taking the rates from the Missouri river to Salt Lake City as 100 per cent.

On May 16 the Southern Pacific launched at West Oakland, Cal., a new car ferry boat, the Contra Costa, for service between Port Costa and Benicia, Cal., to supplement the service now given by the historic steamer Solano. The boat is 433 ft. 4 in. long, its beam is 66 ft. 6 in., and its depth amidships 19 ft. 9 in. It will have four tracks with a capacity of 36 freight cars and two engines, or 24 passenger cars and two engines. For safety there are 14 bulkheads, any one of which may be punctured without endangering the vessel.

With reports indicating record-breaking grain crops for the year, the Missouri Pacific-Iron Mountain system is putting its box cars in first class condition. At the plant of the American Car & Foundry Company at Madison, Ill., from 12 to 15 box cars are being thoroughly overhauled daily. The St. Louis shop of the same company is turning out 5 daily, and the plant at Memphis about the same number. The Sheffield Car & Equipment Company at Kansas City is also doing part of this repair work, about 7 cars daily being the average output for that plant. In addition, the Missouri Pacific shops at Little Rock have been making full repairs to from 5 to 10 cars daily, and the company's shops at Sedalia and De Soto together about 10 cars each day.

The railroads in the state of New Jersey, with the exception of the Delaware, Lackawanna & Western, are said to have withdrawn their objections to the practice of state officers in riding on free passes and, beginning May 20, they have accepted passes issued by proper authority under the law of the state, such passes to be limited to certain state officers. New passes have been issued by the Secretary of State. It appears that this practice is one of long standing, having been begun in 1873, the year of the passage of the general railroad law. The main objection presented by the railroads in their recent action in the courts was that holders of passes had habitually lent them to unauthorized persons. It is now promised that this unlawful practice shall be stopped. The Lackawanna, however, does not acquiesce in the new arrangement. It has announced its intention of honoring the passes of such officers as were included in the special charters granted prior to 1873 and, following the decision in the state supreme court case of *Hoagland v. D. L. & W.*, to such other state officers only whose duties are related to the railroads. It has thus served notice on about 190 officers, such as members of the board of water supply, etc., that it cannot honor their passes and has even ejected four of them from its trains on different occasions.

Car Surpluses and Shortages

Arthur Hale, chairman of the committee on relations between railroads of the American Railway Association, in presenting statistical bulletin No. 157-A, giving a summary of car surpluses and shortages by groups from January 15, 1913, to May 15, 1914, says: The total surplus on May 15, 1914, was 239,406 cars; on May 1, 1914, 230,533 cars; on May 15, 1913, 61,269 cars; on May 9, 1912, 136,776 cars; on May 10, 1911, 188,847 cars, and on May 11, 1910, 127,148 cars. There is a continued increase

in surplus cars, with a larger surplus than for any date since 1909.

A further reduction of surplus is to be noted in the southeast and southwest (groups 4, 5 and 9), and an increase in surplus in the eastern districts (groups 1, 2 and 3).

The total shortage on May 15, 1914, was 764 cars; on May 1, 1914, 1,654 cars; on May 15, 1913, 10,975 cars; on May 9, 1912, 6,678 cars; on May 10, 1911, 1,569 cars, and on May 11, 1910, 4,555 cars. The shortage of 764 cars is merely nominal.

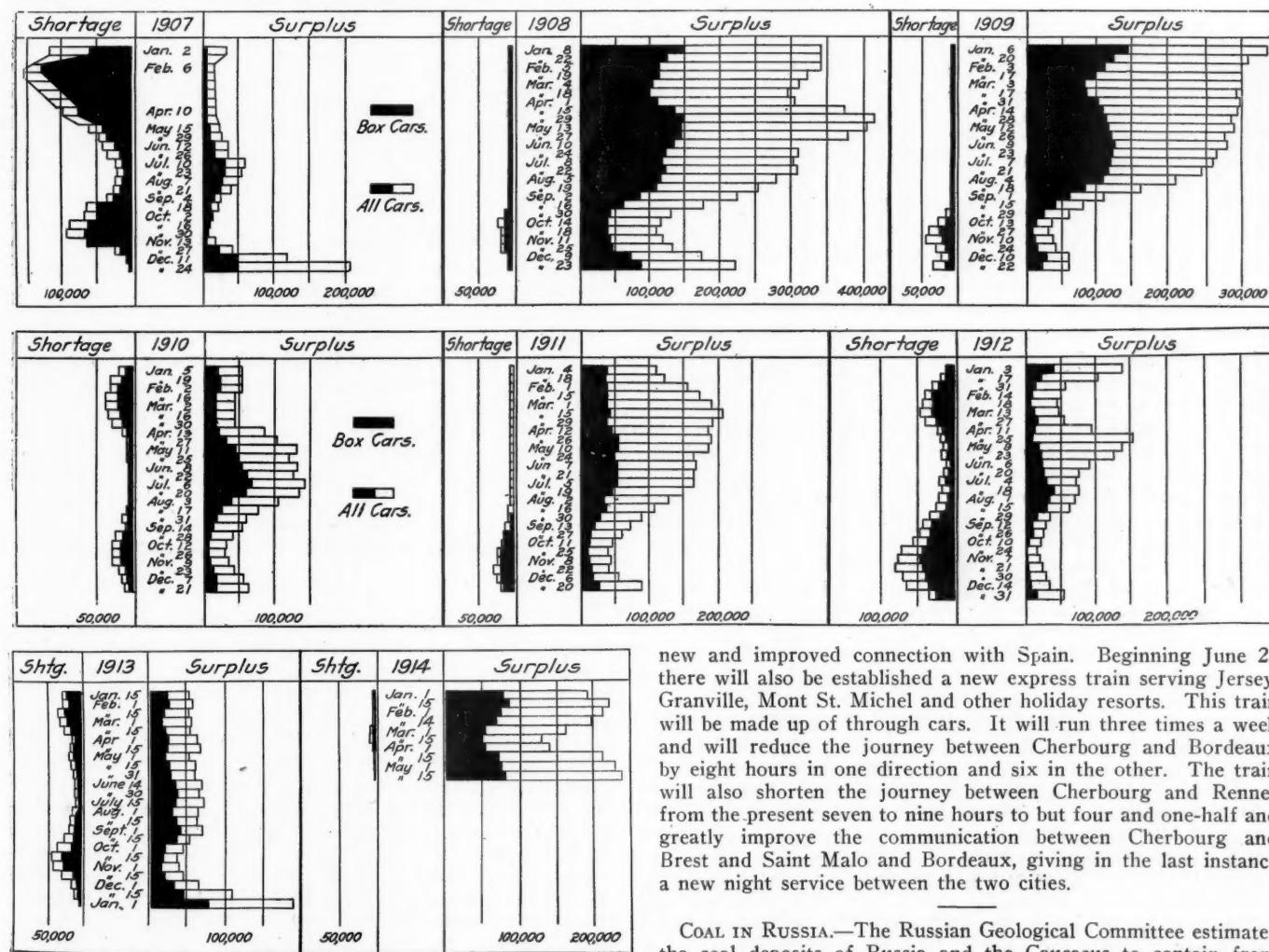
The accompanying table gives car surplus and shortage figures by groups for the last period covered in the report and the diagram shows total bi-weekly surpluses and shortages from 1907 to 1914.

Improved Service on the French State Railways

Last year the State Railways in order to improve communication between the north of France, Normandy, Anjou, Brittany and Touraine introduced a new express service on the "transversal lines," with the result that Rouen, Le Mans, Rennes and Angers were placed in direct communication with each other. The administration has now decided to improve the service and to give better connection between the north and south of the system by extending the express service to La Rochelle and Bordeaux. One result will be a shortening of the journey from Bordeaux to Saint Malo to less than 10 hours. The trains will include through cars with dining cars between Bordeaux and Nantes in either direction. The new service will also give a

Date	No. of roads.	Surpluses					Shortages					
		Box.	Flat.	Coal,	gondola	Other kinds.	Total.	Box.	Flat.	Coal,	gondola	
Group 1.—May 15, 1914.....	7	1,027	455	1,469	518	3,409	0	7	0	0	1	8
" 2.— " 15, 1914.....	26	3,009	208	17,669	6,895	27,781	0	0	0	0	0	0
" 3.— " 15, 1914.....	28	8,102	1,642	50,029	6,677	66,450	0	0	0	250	100	350
" 4.— " 15, 1914.....	11	6,492	973	4,893	1,300	13,658	0	0	0	26	29	55
" 5.— " 15, 1914.....	20	4,975	580	10,136	1,797	17,488	0	76	0	0	0	76
" 6.— " 15, 1914.....	27	15,642	1,003	8,580	7,385	32,610	12	48	20	0	0	80
" 7.— " 15, 1914.....	4	2,098	103	999	2,129	5,329	0	0	0	0	0	0
" 8.— " 15, 1914.....	18	7,374	224	2,706	4,300	14,604	3	0	0	13	3	19
" 9.— " 15, 1914.....	12	3,320	242	441	1,566	5,569	15	0	0	4	0	19
" 10.— " 15, 1914.....	21	13,286	1,889	2,802	12,850	30,827	0	0	0	0	0	0
" 11.— " 15, 1914.....	3	17,565	1,292	0	2,824	21,681	146	0	0	11	157	
Total	177	82,890	8,611	99,664	48,241	239,406	176	131	313	144	764	

*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida lines; Group 6—Iowa, Illinois, Wisconsin and Minnesota lines; Group 7—Montana, Wyoming, Nebraska, North Dakota and South Dakota lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Washington, Oregon, Idaho, California, Nevada and Arizona lines; Group 11—Canadian lines.



Car Surpluses and Shortages, 1907 to 1914

new and improved connection with Spain. Beginning June 25 there will also be established a new express train serving Jersey, Granville, Mont St. Michel and other holiday resorts. This train will be made up of through cars. It will run three times a week and will reduce the journey between Cherbourg and Bordeaux by eight hours in one direction and six in the other. The train will also shorten the journey between Cherbourg and Rennes from the present seven to nine hours to but four and one-half and greatly improve the communication between Cherbourg and Brest and Saint Malo and Bordeaux, giving in the last instance a new night service between the two cities.

COAL IN RUSSIA.—The Russian Geological Committee estimates the coal deposits of Russia and the Caucasus to contain from 70,000,000,000 to 75,000,000,000 tons.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

Examiner Gerry of the Interstate Commerce Commission heard evidence in Chicago on May 18 in the case brought by T. G. Kennedy against the New York Central & Hudson River. Kennedy bought for \$28 a ticket for the Twentieth Century Limited from New York to Chicago, including the \$8 excess fare. At Syracuse he was reached by telegraph and called back to New York. The railroad company, on the ground that it does not sell tickets to Syracuse for this train, offered a refund on the basis of the difference between the fare from New York to Chicago and the fare from New York to Elkhart, Ind., the first point to which these excess fare tickets are sold. Kennedy asked a refund on the basis of a difference between the fare paid and that applicable to Syracuse.

Peanut Rates to Oklahoma City

Opinion by Commissioner Clark:

The commission finds that the carriers have not justified a proposed cancellation of the commodity rate of 56 cents per 100 lb. on peanuts in carloads from New Orleans and other points in southeastern Louisiana to Oklahoma City, Okla., and the substitution therefor of the fourth-class rate of 90 cents. (30 I. C. C., 346.)

Disputed Divisions Not Sufficient Ground for Increased Rates

In re rates on lumber and other forest products from points in Arkansas and other states to points in Iowa, Minnesota and other states. Opinion by Commissioner McChord:

The tariff under suspension is one of the St. Louis Southwestern making increases of approximately one cent per 100 lb. in the rates on lumber and other forest products from points in Arkansas and other states to points in Iowa, Minnesota and other states which was issued as a result of a controversy concerning divisions. The commission holds, as in previous cases, that such disputes are not sufficient to justify increased rates and therefore orders the tariff in question canceled. (30 I. C. C., 371.)

Differential on Lumber to Iowa Points Need Not Be Graded

Wheeler Lumber Bridge & Supply Company et al. v. Atchison, Topeka & Santa Fe et al. Opinion by Commissioner Meyer:

The commission, following the decision in *Betcher Lumber Company v. C. M. & St. P.*, holds that the failure of the carriers to grade a differential of five cents per 100 lb. over the 50 cent rate to the Missouri river on shipments of fir lumber and fir-forest products from Pacific coast points to destinations in Iowa does not result in discrimination. The blanket principle of rate making is properly applied to lumber. The traffic at present moves through Minnesota Transfer over the lines of the Northern Pacific and Great Northern. If the differential is graded the traffic will move largely through Omaha and the two railways will not be able to retain for themselves the long haul on shipments originating on their lines. (30 I. C. C., 343.)

Increased Rates on Packing-House Products Refused

In re rates on packing-house products, fresh meats and other commodities from Mason City, Ia., and other points to points in Arkansas and Texas. Opinion by Commissioner Clements:

The tariffs under consideration in this case increase the rates on packing-house products and fresh meats from Mason City, Ia., and Austin and South St. Paul, Minn., to points in Arkansas and Texas, the purpose being to restore the three points of origin to the Fox River group to which they formerly belonged. The commission holds that the present rates must be maintained as maxima for the future. At the present time the rates on packing-house products, for instance, from the three points are on a differential of 9½ cents over the rates from St. Louis and 2½

cents over those from Marshalltown, Ia. The proposed differential of 8 cents over the latter point, Waterloo, and other points in Iowa is held, in consideration of the relative location and distances with respect to St. Louis and Kansas City, the basing points on this traffic, to be too great. (30 I. C. C., 341.)

Demurrage on Forest Products for Export from New Orleans

Anderson-Tully Company et al. v. Morgan's Louisiana & Texas Railroad & Steamship Company et al. Opinion by Commissioner Clark:

The commission finds nondiscriminatory to shippers of forest products to New Orleans on local bills of lading an arrangement whereby the carriers, in order to secure prompt release at New Orleans of equipment reaching that port loaded with forest products for export will not issue at interior points through export bills of lading for forest products except in conjunction with steamship companies which agree to assume the expense of demurrage at New Orleans. It is held that the carriers have merely exercised their right to impose upon the steamship companies penalties for the detention of equipment bearing through export lading. No reason is found for reversing the decision in *New Orleans Board of Trade v. I. C.*, in which it was held that the rules of assessing demurrage and storage charges at New Orleans against shipments of forest products moving on local bills of lading for export were not unjustly discriminatory as compared with the grant of unlimited free time on shipments moving under through export bills of lading. (30 I. C. C., 140.)

Wichita Discriminated Against

Wichita Business Association v. Atchison, Topeka & Santa Fe et al. Opinion by Commissioner McChord:

The commission finds that an adjustment of rates whereby Wichita cannot ship agricultural implements in the same car mixtures as Kansas City to Texas except under rates which make a much larger combination rate from the manufacturing points on the Mississippi river and east thereof for Wichita than Kansas City enjoys, results in discrimination. The carriers are therefore given until August 1 to adjust these commodity rates out of Wichita so that the same relative difference is maintained as now exists between class rates applicable from the two cities. (30 I. C. C., 374.)

Minimum Weights on Fresh Meat Increased

In re minimum weights on fresh meat and other commodities. Opinion by Commissioner Daniels:

The commission finds that a proposed increase from 10,000 to 15,000 lb. in the minimum weights for shipments of butter, eggs, dressed poultry, fresh fish and fresh meat from Chicago to southern territory will be justified provided a similar charge is made in the rules relating to shipments from St. Louis. A carrier should not be required to furnish a special service such as this unless it be allowed as an incident to protect its revenues by requiring a substantial loading sufficient adequately to utilize its equipment. (30 I. C. C., 349.)

The Minnesota Rate Case as Affecting Interstate Passenger Fares

Hans Trier v. Chicago, St. Paul, Minneapolis & Omaha et al. Opinion by Commissioner Daniels:

Complainant bought a through ticket from Clinton, Ia., to Henning, Minn., paying therefor \$11.50, the regularly published joint fare, and traveled by means of it over the Chicago, Burlington & Quincy to St. Paul and thence over the Northern Pacific to destination. The fare of the Burlington from Clinton to St. Paul was \$6.28, and that of the Northern Pacific from St. Paul to Henning was \$5.19, the total being three cents less than the through rate. He later traveled from Wadena, Minn., to Hudson, Wis., paying the regularly published joint fare of \$5.64, which was thus 30 cents in excess of the sum of the rate of \$4.74 over the Northern Pacific from Wadena to St. Paul applicable on interstate traffic, and that of 60 cents over the Chicago, St. Paul, Minneapolis & Omaha from St. Paul to Hudson. It is contended, however, that under the decision in the *Minnesota Rate Case* the legal fare from St. Paul to Henning was \$3.56, and that from Wadena to St. Paul was \$3.18; that the through rates on the two

journeys were therefore unreasonable in that they exceeded the aggregates of these fares established by law within Minnesota and the interstate charges between Clinton and St. Paul and between St. Paul and Hudson. Reparation in the sum of \$3.52 is demanded, \$1.66 of which is excess in fare to Henning and \$1.86 in excess in fare to Hudson. The commission holds that the complainant is not entitled to reparation on the grounds on which his complaint is brought. In the instant case the commission is asked to accept as a sufficient determinant of the unreasonableness of an interstate fare the single fact that a lower rate per mile as applicable to the traffic wholly within one state partly traversed in making said journey has been judicially upheld by the Supreme Court. The finding of that body was merely that the two cent fare per mile for intrastate Minnesota transportation had not been proved confiscatory and therefore was not unconstitutional. A rate or fare that is merely nonconfiscatory may fall short of one which is entirely just and reasonable. Complainant rests his whole charge that the interstate fares collected are unjust and unreasonable on the ground that two cent per mile rate-scale in one of the states traversed had not been shown, as far as intrastate business is concerned, to have been confiscatory. This one fact is not sufficient to permit the commission to determine the reasonableness of the rates involved especially in view of the fact that it has been held that while the decisions of the several state railroad commissions are worthy of consideration, the commission is not justified under the law in accepting a comparison of lower intrastate rates prescribed by the state authorities with those applying on interstate traffic as conclusive of the unreasonableness of the interstate rates. In view of the fact that the rates charged were in excess of the intermediate rates over the same routes, reparation is awarded in the sum of 33 cents, the amount of the excess. (30 I. C. C., 352.)

STATE COMMISSIONS

The California Railroad Commission has granted the petition of the Pullman Company for a rehearing of the case in which the commission recently censured the Pullman Company for paying its employees such low wages that they are compelled to depend on tips for a living. Further evidence will be heard by the commission in July.

The Minnesota Railroad and Warehouse Commission held a hearing in St. Paul on May 19, on the application of the United Commercial Travelers for a reduction in the rates for excess baggage. A. C. Johnson, passenger traffic manager of the Chicago & North Western, was the principal witness for the railways. The Commercial Travelers had submitted their evidence to the commission on March 26.

The Pennsylvania Water Supply Commission has granted permission for construction of the following bridges: Pennsylvania Railroad to build over Conemaugh river at Dornock Point, near Johnstown; Cumberland Valley Railroad to enlarge bridge over Susquehanna at Harrisburg; West Side Electric Street Railway to build two bridges near Charleroi. The Pennsylvania Railroad has applied for permission to build a bridge in Perry township, Clarion county; the Wilkes-Barre Connecting Railroad to enlarge bridge over Susquehanna at Wilkes-Barre.

Oil Burning Engines Must Be Used in New York Forests

The New York State Public Service Commission, Second district, has denied the application of the New York Central & Hudson River for permission to use coal burning locomotives in the Adirondack forest. Under a law passed six years ago the company has been obliged to use, on its lines in that region, oil burning locomotives, to avoid setting fires; but this has cost \$90,000 more, yearly, than coal; and the company avers that the coal burning engines have been made safer than formerly. The commission, however, refused to change its rule.

The parties opposing the company's petition claimed that the estimate of \$90,000 was excessive, but this point was not argued, as the commissioner who heard the case announced that the question of expense, unless more important than had thus far been shown, would not figure in the settlement of the question at issue. The rule of the commission forbidding the use of

coal-burning engines does not apply between November 1 and April 15, nor in any month between 8 p. m. and 8 a. m. The report on the case says that there is practically no danger of fires being started by coal-burning engines during the night.

The opinion, which is by Chairman VanSantvoord, says:

"While not failing to commend all that has manifestly been accomplished by the railroad corporation in its efforts to meet the existing demands of the public welfare, we are unable to decide that enough has as yet been accomplished to justify any relaxation of safeguards which are proved to be thoroughly effective—or to find that we may properly sanction the abandonment of a definite proposition in safety for an indefinite one. As has been well observed by a friend of the court, the preservation of the state's forests from fire and destruction transcends in importance all questions of expediency, convenience or economy, and demands the adoption and enforcement of every possible protective and preventive measure."

PERSONNEL OF COMMISSIONS

Frank T. Oakley, whose appointment as senior structural engineer of the Pacific district, division of valuation, Interstate Commerce Commission, with headquarters at San Francisco, Cal., has already been announced in these columns, was graduated from the University of Kansas, class of '86. During the years 1884 to 1887, he spent three months on U. S. government surveys in southwestern Kansas; two months as draftsman and transitman on townsite surveys in Topeka, and five months as draftsman, rodman, clerk to resident engineer and division engineer. He was subsequently draftsman for the Burlington & Missouri River in Nebraska; assistant engineer townsite surveys at Topeka, and in the office of the city engineer at that place, until 1889, when he was employed by the Oregon & Washington Railway until the early part of 1891 as assistant to resident engineer and resident engineer, on construction of mountain lines in eastern Oregon and Washington. He was then with the Ann Arbor for six months as locating engineer, and later was with the Keystone Bridge Company and the Mount Vernon Bridge Company as draftsman, until June, 1894. He returned to the Ann Arbor and was for six months locating engineer and bridge engineer, and was then first assistant city engineer at Toledo, Ohio, until April, 1899. He designed, and was engineer of construction of the sewer system at Warsaw, Ind.; was engineer for the Toledo Bridge Commission, and was inspector of roadway bridges and buildings for the appraisal of the railroads of Michigan, during 1899 and 1900. From 1901 to 1903, he was chief engineer of the Toledo & Western Railway, and during the latter year was assistant engineer to Prof. M. E. Cooley, expert appraiser on Michigan railway tax suits. In 1904 he was engineer for the Toledo Traction Company; 1905 to 1907, division engineer of the Franklin & Clearfield Railroad, and during 1907 and six months of 1908, was assistant engineer of the People's Water Company at Oakland, Cal. He was then appointed bridge engineer of the Northwestern Pacific, which position he held at the time of his recent appointment on the Interstate Commerce Commission as senior structural engineer of the Pacific district, division of valuation, as above noted.

COURT NEWS

The Supreme Court of the United States, in a decision handed down last Monday, declared unconstitutional the reciprocal demurrage law of Oklahoma, the law, as interpreted by the state court, applying to interstate as well as intrastate commerce.

The Vandalia was convicted on two counts in the federal court at East St. Louis on May 19 of paying rebates to the Lumaghi Coal Company of East St. Louis, by borrowing money from a bank at 4 per cent., and loaning it to the coal company at 2 per cent.

The Supreme Court of the United States, in a decision handed down last Monday, in a suit brought by the Erie Railroad, sustained the law of the state of New York requiring that railway employees be paid, in cash, twice a month. The law was held to be a valid exercise of the police power of the state.

The Missouri Supreme Court last week rendered a decision

sustaining the right of express companies to reject C. O. D. shipments of liquor to points in Texas. A shipper had sought to collect from Wells, Fargo & Co. and the Pacific Express Company the value of liquors the companies had refused to deliver in violation of the law.

Judge Van Valkenburgh, of the United States District Court, at Kansas City, Mo., on May 25, rendered a decision referring back to the state courts the suits filed by the attorney-general of Missouri against railways in the state, asking a refund of \$24,000,000 for alleged excessive fares and freight rates collected by the roads while the state rates were in litigation.

The Great Northern has filed a suit in a Minnesota court to restrain the state railroad commission from enforcing an order defining industrial centers without reference to city limits. The road interpreted strictly the provisions of the Cashman distance tariff law, which became effective on January 1, and charged distance rates from some points which formerly took switching rates. The commission then extended the industrial center limits to enable certain shippers to take advantage of the switching rates.

The Supreme Court of the United States on Monday last, in a decision by Justice McKenna declared unconstitutional the law of New York state limiting the work day of telegraphers, in railroad operation, to eight hours. It had been claimed that this statute limiting the hours to eight per day did not conflict with the federal law prescribing nine hours a day, but merely supplemented it. This argument the court rejects. The state law regulating interstate commerce was superseded immediately when Congress acted in a way to manifest its purpose to exercise control over it in this detail. The employee over whose acts the suit was brought worked in a service where most of the trains were interstate.

Commerce Court Sustained in Tap Line Cases

The Supreme Court of the United States, in a decision by Justice Day, handed down May 25, holds that the Interstate Commerce Commission exceeded its authority when it decided against the maintenance of joint through rates over railroads and short lines to lumber plants, on the ground that the lumber company's railroad was only a plant facility; and sustains the Commerce Court in its decision rendered last December (*Railway Age Gazette*, December 5, p. 1096) declaring unlawful the orders which had been issued in these cases by the Interstate Commerce Commission.

The decision recognizes that the so-called tap lines are common carriers, enjoying rights as such under the laws of the states in which they lie. The decision was made in the case of the Louisiana & Pacific Railway Company and others.

The Commerce Court in its decision last year held as follows:

"The commission was not only without power to forbid any allowance whatsoever to be made by a trunk line to the petitioning proprietary industries for switching either less than 1,000 ft. or more than three miles, but it was also without power to prohibit the making of joint rates by the trunk lines and the petitioning tap lines and the payment by the former to the latter of some division thereof for its services in hauling logs to and lumber from the petitioning proprietary mills, and its order must to this extent and as to these petitioners be annulled.

"The commission is, of course, fully empowered to regulate the amount of allowances and divisions so as to prevent rebates and unjust discriminations. In this way, as well as by the prohibition of or prosecution for certain illegal practices mentioned in the report, whereby proprietary mills obtain undue advantages, most of the evils which the commission has sought by its order to prevent, will be checked. But the common ownership of industrial and common carrier transportation facilities does not constitute a legal wrong. . . ."

Before the Supreme Court the question of jurisdiction of the Commerce Court was raised, but to this Justice Day devoted only one paragraph, holding that there was no reason to differ from the decision reached in the Procter & Gamble case, and that the Commerce Court had jurisdiction in the tap-line cases.

Most of his decision is devoted to a discussion of the ques-

tion, "Are the tap lines plant facilities only or common carriers, with rights and obligations as such?" It was claimed that these roads were not common carriers because most of their traffic was in their own logs and lumber; "but," says the opinion, "this conclusion loses sight of the principle that the extent to which a railroad is in fact used does not determine the fact whether it is or is not a common carrier. It is the right of the public to use the road's facilities and to demand use of it, rather than the extent of its business, which is the real criterion determination of its character. . . . The commission exceeded its authority when it condemned these roads as a mere attempt to evade the law and secure rebates and preferences for themselves."

"It is doubtless true, as the commission amply shows in its full report and supplemental report in these cases, that abuses exist in the conduct and practice of these lines and in their dealings with the carriers, which have resulted in unfair advantages. . . . But our conclusion that the tap lines are common carriers falls far short of deciding that the divisions of joint rates may be made at the will of the carriers involved and without any authority of the commission to control them. That body has the authority and it is its duty to reach all unlawful discriminatory practices resulting in favoritism and unfair advantages to particular shippers or carriers. . . ."

The "tap lines" involved in the decision all belong to lumber companies. The commission's decision against them was based on complaints by lumber concerns that their competitors who conducted the tap lines were receiving allowances from the railroads out of all proportion to the service rendered and which virtually amounted to rebates.

The present decision will necessarily guide the Interstate Commerce Commission in deciding the numerous "industrial road" cases now being considered by it. The question, What is a railroad? will still be up for consideration, for some of the "industrial" cases involve the movement, by the railroads, of cars on industrial tracks, for distances of only a few rods, the service performed by the railroad being of the nature of "spotting" cars more than that of transportation.

The "tap lines" directly involved in the original decision of the Interstate Commerce Commission were the Louisiana & Pacific Railway Company, the Woodsworth & Louisiana Central, the Mansfield Railway and Transportation Company, the Victoria Fisher & Western, all of Louisiana, and the Butler County Railroad of Missouri.

RAILWAY CONSTRUCTION IN BOLIVIA.—One of the first of the new lines to be undertaken by the Bolivian government will be that from Esmeralda to Quito. It will run through the four northern provinces of the republic, and will open up a large area of rich agricultural land and permit the exploitation of many hitherto undeveloped mines at present practically inaccessible because of the lack of adequate transportation facilities. Another line soon to be begun is that from Babahoyo to Ventana. The Porto Vello to Guayaramerin line, also constructed by the government, was finished and opened to traffic some time ago in accordance with the agreement entered into with the Brazilian government by what is known as the treaty of Petropolis. At the present time there are about 806 miles of railway in operation in Bolivia; 390 miles are under construction, and there are nearly 1,860 miles to be built within the next few years.

RAILWAY CONSTRUCTION IN SALVADOR.—On March 24, a contract was signed in the office of the Ministry of Public Works for the construction of a railroad from the port of La Libertad, on the Pacific ocean, inland to the town of Santa Tecla, about 20 miles distant in a straight line. The construction of this railroad will also include the purchase and merger of the San Salvador & Santa Tecla Railroad. The new line will be about 25 or 26 miles long. It will be built under the supervision of engineers of the Salvadorian government and will be turned over to the nation by the contractor in sections as completed, the entire line to be completed in 18 or 20 months. The estimated cost is about \$42,000 per mile. The contract has to receive the approval of the National Legislative Assembly before work can be started on it, but it is said that that approval is almost certain. At any rate, it is hoped to begin construction in October of this year in order that the road may be completed and opened for traffic early in 1916.

Railway Officers

Executive, Financial, Legal and Accounting

F. W. Charske has been appointed auditor of freight accounts of the Union Pacific, with office at Omaha, Neb., vice W. H. Anderson, retired under the pension rules of the company.

John F. Auch, vice-president and freight traffic manager of the Philadelphia & Reading, with headquarters at Philadelphia, Pa., has been appointed vice-president and traffic manager, in charge of freight and passenger traffic.

E. H. Seneff, who has been appointed general solicitor of the Pennsylvania Lines West of Pittsburgh, with headquarters at Pittsburgh, Pa., as has already been announced in these columns, was born at Mount Eaton, Ohio, September 25, 1867. He was educated at Valparaiso University, 1885-1889, and at the Chicago College of Law, 1894-1896. He became connected with the Chicago & Eastern Illinois in 1895, and subsequently was made general solicitor at Chicago, which position he resigns June 1 to become general solicitor of the Pennsylvania Lines, as above mentioned.

William S. Kies, general counsel of the Chicago & Western Indiana Railroad and Belt Railway of Chicago, will resign shortly to become connected with the National City Bank of New York. He expects to leave for New York early in June, but will continue to act as general counsel for the above companies for a time thereafter. Mr. Kies, who is 36 years of age, came to Chicago after graduation from the University of Wisconsin Law School in the fall of 1901, and entered the law offices of Peck, Miller & Starr. In 1903 he was assistant city attorney of Chicago, and the following year was appointed chief trial attorney for the city. He was made general attorney of the Chicago & North Western in 1905, resigning in 1910 to become general solicitor of the Chicago & Western Indiana Railroad and the Belt Railway of Chicago, and in 1912 he was appointed general counsel of those roads.

Marcus L. Bell, whose appointment as general solicitor of the Rock Island Lines has already been announced in these columns, was born January 11, 1880, at Pine Bluff, Ark. He was graduated from the University of Arkansas in 1898, and from the University of Chicago in 1903. He entered railway service in June, 1904, as private secretary to the chairman of the executive committee of the Chicago, Rock Island & Pacific at New York, and on January 1, 1905, was made assistant attorney at Chicago. In November of the following year he was appointed local attorney at Chicago, and on August 1, 1909, he became assistant general attorney, being promoted to general attorney in April, 1910. He now becomes general solicitor of the Rock Island Lines, with headquarters at Chicago, effective May 1, as noted above.

Operating

The office of S. Ennes, general superintendent of the Western Maryland, has been transferred from Baltimore, Md., to Hagerstown.

J. B. White, trainmaster of the Baltimore & Ohio at Weston, W. Va., has been appointed assistant trainmaster, with office at Brunswick, Md., succeeding C. L. Todd.

X. H. Cornell, superintendent of transportation of the Pere Marquette, and formerly superintendent of transportation of the Chicago & Alton, has been appointed master of transportation of the latter road, with headquarters at Bloomington, Ill.

S. P. Henderson, superintendent of the Northern division of the Chicago & Alton, with headquarters at Bloomington, Ill., will, effective June 1, have his authority extended over the Southern division, also succeeding C. W. Miller, resigned.

H. H. Broughton has been appointed assistant superintendent of the Cleveland division of the Baltimore & Ohio, with headquarters at Canal Dover, Ohio, and J. W. Root, trainmaster at Wheeling, W. Va., has been appointed assistant superintendent of the Wheeling division, with headquarters at Benwood, W. Va.

W. H. Foster, superintendent of the Shore Line division of the New York, New Haven & Hartford, at New Haven, Conn., has been appointed superintendent of the New York division, with headquarters at Harlem River, N. Y., succeeding C. H. Motsett, resigned to become general manager of the Panama Railroad, with headquarters at Panama. J. D. Gallary, superintendent of the Providence division at Providence, R. I., succeeds Mr. Foster. R. D. Fitzmaurice, superintendent of the Western division at Waterbury, Conn., succeeds Mr. Gallary and M. D. Miller, trainmaster at Providence, R. I., succeeds Mr. Fitzmaurice.

G. B. Vilas, whose appointment as general superintendent of the Chicago & North Western lines in Illinois, Iowa, Wisconsin and Michigan, with headquarters at Chicago, has already been announced in these columns, was born April 18, 1868, at Ogdensburg, N. Y. He was educated at Phillips Exeter Academy, and began railway work in September, 1887, with the Chicago & North Western, with which company he has remained ever since. Until 1898 he was engaged in station work at Eagle Grove, Iowa, and Madison, Wis., and was agent at Kenosha, Wis. The following six years he was local freight agent at Milwaukee, Wis.; the four years from 1904 to 1908, he was trainmaster, and then until 1908, he was assistant superintendent at Baraboo, Wis. Mr. Vilas was then for

two years superintendent, and on April 1, 1912, was made assistant general superintendent of the lines in Illinois, Iowa, Wisconsin and Michigan, over which lines he is now appointed general superintendent, as above noted.

Traffic

W. B. Harris, traveling agent of the Western Express Company, has been appointed general agent at Chicago, effective on July 1.

R. E. Tipton has been appointed general freight and passenger agent of the Galveston, Houston & Henderson, with office at Galveston, Tex., to succeed W. F. McClure, resigned.

Engineering and Rolling Stock

R. J. Greiner has been appointed general foreman of the Missouri, Kansas & Texas at Smithville, Tex., in place of Max Chase, resigned.

W. T. Lovell has been appointed master mechanic of the Oregon-Washington Railroad & Navigation Company, with headquarters at Portland, Ore., succeeding James Healy, resigned.

O. S. Bowen, resident engineer of the Great Northern at Seattle, Wash., has been appointed principal assistant engineer,



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G. B. Vilas



M. L. Bell

with headquarters at the same place, succeeding Alexander Stewart, granted leave of absence on account of ill health.

J. W. Hungate has been appointed electrical superintendent of the Spokane & Inland Empire, with headquarters at Spokane, Wash. The jurisdiction of John Dickson, general master mechanic of the Spokane, Portland & Seattle and the Oregon Trunk, with headquarters at Portland, Ore., has been extended over the Spokane & Inland Empire.

L. A. Richardson, mechanical superintendent of the Third district of the Chicago, Rock Island & Pacific at El Reno, Okla., has been transferred to Des Moines, Iowa, as mechanical superintendent of the First district, succeeding H. C. Van Buskirk, resigned. R. L. Stewart, master mechanic at Chicago, succeeds Mr. Richardson, and P. J. Colligan, master mechanic at Dalhart, Tex., takes the place of Mr. Stewart. W. B. Wilson, general boilermaker at Silvis, Ill., succeeds Mr. Colligan as master mechanic at Dalhart.

J. T. Luscombe, who has been appointed master mechanic of the Ohio River division of the Baltimore & Ohio, with office at Parkersburg, W. Va., as has been announced in these columns, was born on June 29, 1874, at Queenstown, Cork county, Ireland. After a high school education at Belleville, Ont., in 1891, he began railway work with the Grand Trunk Railway at the same place. During the ten years from 1891 to 1901 he was with a number of roads as machinist, and also studied at the Scranton school. In May, 1901, he was made general foreman of the Baltimore & Ohio at Uhrichsville, Ohio, and was later transferred to Newark, Ohio, as machine shop foreman. In 1905 he went with the Chicago & Alton as machine shop foreman at Bloomington, Ill., and in September, 1907, became general foreman of the Toledo & Ohio Central at Bucyrus, Ohio. In March, 1908, he was promoted to master mechanic, and four years later was appointed master mechanic of the Cleveland, Cincinnati, Chicago & St. Louis, with office at Bellefontaine, Ohio. He resigned from that position in October, 1913, to go to the National Boiler Washing Company, Chicago, and now returns to railway work as master mechanic of the Ohio River division of the Baltimore & Ohio, as above noted.

OBITUARY

Edward Hogan, roadmaster of the Lake Erie & Western at Tipton, Ind., died on May 13 at Bloomington, Ill.

J. P. Hayden, auditor of the Texas State Railroad, with office at Rusk, Tex., was killed in an automobile accident on May 14.

J. Roy Dillon, president of the Texas City Terminal Company, with headquarters at Texas City, Tex., died at Mineral Wells, Tex., on May 18.

A. A. Sinclair, superintendent of bridges and buildings of the Duluth, Missabe & Northern, died on May 14 at Duluth, Minn., as a result of being struck by an engine in the Proctor yards near Duluth.

Thomas R. Limer, superintendent of transportation of the Hocking Valley, with headquarters at Columbus, Ohio, died on May 19, aged 50 years. Mr. Limer had been in railway service since December, 1886, and had been connected with the Columbus, Hocking Valley & Toledo and its successor, the Hocking Valley, since March, 1890. He was consecutively chief clerk in charge of the car record office, car service agent, superintendent of car service and superintendent of transportation, having held the latter position four years.

Jacob O. Brinkerhoff, superintendent of the Kansas division of the Union Pacific at Kansas City, died in that city on May 22. He was born on March 3, 1839, in Tioga county, N. Y., and began railway work in May, 1865, as a brakeman on the Union Pacific Railway. He was then consecutively baggageman, freight and passenger conductor and local dispatcher at Kansas City, Mo., until July, 1877, when he was appointed superintendent of the Smoky Hill division. The following year he was appointed superintendent of the Kaw Valley division, remaining in that position until November, 1884, when he was appointed superintendent of the Kansas division. From January 1, 1891, to November, 1898, he was general superintendent, and since that time was superintendent of the same division. Mr. Brinkerhoff's entire service was with the Union Pacific Railway and its successor, the Union Pacific Railroad.

Equipment and Supplies

LOCOMOTIVE BUILDING

THE MCLOUD RIVER has ordered one mikado type locomotive from the Baldwin Locomotive Works.

THE PUBLIC BELT OF NEW ORLEANS has ordered 2 six-wheel switching locomotives from the Baldwin Locomotive Works.

THE NORTHWESTERN IRON COMPANY, Mayville, Wis., has ordered one six-wheel switching locomotive from the Baldwin Locomotive Works.

THE ST. LOUIS, BROWNSVILLE & MEXICO, reported in the *Railway Age Gazette* of May 1, as having ordered 15 consolidation type locomotives from the Baldwin Locomotive Works, has placed orders for 20 locomotives of that type with that company.

THE SOLVAY PROCESS COMPANY, Syracuse, N. Y., has ordered 2 superheater six-wheel switching locomotives from the American Locomotive Company. These locomotives will have 21 by 26 in. cylinders; 51 in. driving wheels, a total weight in working order of 157,000 lb., and a steam pressure of 170 lb.

THE CUBAN CENTRAL RAILWAYS, LIMITED, have ordered one superheater eight-wheel passenger, 13 superheater ten-wheel passenger and one consolidation type freight locomotives from the American Locomotive Company. The eight-wheel locomotive will have 21 by 26 in. cylinders, 51 in. driving wheels, a total weight in working order of 157,000 lb., and a steam pressure of 170 lb. The ten-wheel locomotives will have 18 by 24 in. cylinders, 50 in. driving wheels, a total weight in working order of 120,000 lb., and a steam pressure of 180 lb. The consolidation type locomotive will have 16 by 20 in. cylinders, 38 in. driving wheels, a total weight in working order of 98,000 lb., and a steam pressure of 160 lb.

CAR BUILDING

THE LAKE CHAMPLAIN & MORIAH is in the market for 20 hopper cars.

THE BATESVILLE SOUTHWESTERN is in the market for 60 60,000 lb. capacity flat cars.

THE UNION PACIFIC has ordered 107 steel passenger cars from the Pullman Company.

THE ERIE has ordered 7 coaches and 3 or 4 other passenger cars from the Pullman Company.

PHELPS-DODGE & COMPANY, New York, have ordered 25 ore cars from the Pressed Steel Car Company.

THE CHICAGO & NORTH WESTERN has ordered 250 Rodger ballast cars from the American Car & Foundry Company.

THE ST. LOUIS, BROWNSVILLE & MEXICO has ordered 800 box and 20 caboose cars from the American Car & Foundry Company.

THE GREAT NORTHERN is reported to be preparing to build 1,400 freight cars in its own shops. This item has not been confirmed.

THE UNION PACIFIC is said to have ordered 500 50-ton box and 400 50-ton automobile cars from the Bettendorf Company. This item has not been confirmed.

IRON AND STEEL

THE CHICAGO, MILWAUKEE & ST. PAUL has ordered 110 tons of bridge material from the Wisconsin Bridge & Iron Company.

SERVIA AND THE ORIENTAL RAILWAY.—The Servian government has resolved to build a line parallel to the Oriental Railway in case it cannot come to an understanding with Austria-Hungary with reference to the latter.

Supply Trade News

Leman D. Doty, for 23 years purchasing agent for the Illinois Steel Company, died on May 24 at his home in Chicago.

The Chicago Steel Tape Company has established a downtown office at 900 Lytton building, corner Jackson boulevard and State street, Chicago.

C. W. Boynton, of Chicago, for the past 10 years inspecting engineer for the Universal Portland Cement Company, has been appointed engineer in charge of construction and operation for the Sonoma Magnesite Company of California.

G. H. Dixhold, for twelve years advertising service manager of the Simmons Hardware Company, St. Louis, Mo., and formerly editor of *Hardware*, New York, has been appointed advertising and publicity manager of the Walter A. Zelnicker Supply Company, St. Louis, Mo.

G. Fred Collins, the Pittsburgh representative of the Protectus Paint Company, Philadelphia, manufacturers of Protectus paints and railroad selling agents for the Barber Asphalt Paving Company products, has left the service of the company, and the Pittsburgh office has been discontinued.

The Chicago agency of the Industrial Works, Bay City, Mich., formerly with Mudge & Co., has been discontinued. For the present the Chicago territory will be handled from the main office in Bay City, but in the near future a sales office will be opened in Chicago under the name of the Industrial Works.

The Prince-Groff Company, manufacturing "Pressurlok" water gage systems, the "Wedglok" track drilling system and "Kwikgrip" pipe wrenches, has recently elected a new staff of officers and also moved its general offices to 50 Church street, New York. The new officers are Sherman W. Prince, president; George W. Steinmetz, treasurer, and Clarence B. Groff, vice-president. Charles H. Spotts has been appointed sales manager.

Edward T. Stotesbury has retired from the board of directors of the Cambria Steel Company, the vacancy caused by his resignation having been filled by the election of E. Silck, vice-president and general manager. Mr. Stotesbury has also resigned from the board of the Cambria Iron Company, which is controlled by the Cambria Steel Company, and has withdrawn from the executive committee of the board of the Pennsylvania Steel Company.

F. N. Kollock, Jr., formerly district manager of the Seattle office of the Westinghouse Electric & Manufacturing Company, has resigned his position to become treasurer and assistant secretary of the Westinghouse Lamp Company, Bloomfield, N. J. He has been succeeded by W. D. McDonald, formerly branch manager of the Minneapolis office. C. C. Curry has been appointed acting branch manager of the latter office.

F. W. Coolbaugh, widely known in the railway supply trade, died on Saturday morning, May 16, at his home in Philadelphia. Mr. Coolbaugh was born at Stroudsburg, Pa., on August 21, 1848. At the age of 12 he entered the employ of the Delaware, Lackawanna & Western Railroad as water boy on a gravel train. He later became telegraph operator and was subsequently chief despatcher at Hoboken. In 1882 he entered the railway supply field as a salesman for Armour & Osterhaut, manufacturers of railway lanterns. He later became senior member of the firm of Coolbaugh, McMunn & Pomeroy, general sales agents in New York and the east for Carnegie, Phipps & Company; the Cambria Steel Company; the Boies Steel Wheel Company; the Lukens Iron & Steel Company, and the Latrobe Steel Company. In 1895, he purchased the patent rights of the Marden brake beam, and established the Sterlingworth Railway Supply Company at Easton, Pa., where from 1896 to 1902 the beam was manufactured and applied to nearly half a million cars. He continued in the malleable iron and rolling mill department of business until 1907, when he moved to Philadelphia as president of the Acme Railway Equipment Company, in the manufacture and sale of their uncoupling device. In 1908 he built and operated the Provincial Steel Company, Ltd., at Coburg, Ont.

Railway Construction

CHICAGO & NORTH WESTERN.—The Walsh Construction Company has been awarded a contract for the reduction of northbound grades between Radnor, Ill., the first station north of Peoria, and the main line connection at Nelson, Ill., from the present grade of 1 per cent. to a maximum of .5 per cent.

CHICAGO, PEORIA & QUINCY.—According to press reports most of the surveys have been completed and the right of way arranged for building from the Illinois Traction Company's line at Peoria, Ill., southwest to Quincy, about 120 miles, and the company expects to begin grading work in June. J. L. Soebbing, president, Quincy, Ill., and the Chapman Company, Steger building, Chicago, is in charge of the engineering work. (October 17, p. 726.)

DORR COUNTY PENINSULA.—This company will start work soon, it is said, on a 40-mile line from Sturgeon Bay, Wis., to a point north of that place. E. E. Galle & Company, Plymouth building, Minneapolis, Minn., may be addressed. F. D. L. Hunt is directing engineer.

FLORIDA ROADS (Electric).—A company is being organized, it is said, to build from New Smyrna, Fla., west to Lake Helen, thence to either Enterprise or to De Land, about 25 miles. S. E. Carmichael, Lake Helen, Fla., may be addressed.

GALVESTON, HARRISBURG & SAN ANTONIO.—A contract is reported let to Garvin & Davis, Houston, Tex., to build the loop line from La Porte, Tex., to Seabrook. (May 22, p. 771.)

MICHIGAN ROADS (Electric).—Residents of Muskegon, Mich., are back of a project to build an electric railway from that city east via Stanton to Saginaw, about 125 miles. It is said that right of way has been secured from Muskegon to Stanton, 57 miles.

NEW YORK SUBWAYS.—Bids are wanted by the New York Public Service Commission, First district, on or before June 12, for the construction of section No. 7 of route No. 5, the Lexington avenue subway, in the borough of Manhattan, from Forty-third street north under Lexington avenue to a point 50 ft. north of Fifty-third street, and on June 16 bids are wanted for the construction of section No. 1 of route No. 12 of the Eastern Parkway subway, in the borough of Brooklyn, from Atlantic and Flatbush avenues, under Flatbush avenue, to a point about 274 ft. southeast of St. Marks avenue. The contract for the construction of section No. 2 of routes Nos. 4 and 36 of the Broadway subway, in the borough of Manhattan, between Twenty-sixth and Thirty-eighth streets, including a local station at Twenty-eighth street and an express station at Thirty-fourth street has been let to the United States Realty & Improvement Company for \$2,657,004, and the contract for the construction of section No. 6-A of routes Nos. 4 and 38 of the Seventh avenue subway in Manhattan, was awarded to the Holbrook, Cabot & Rollins Corporation, at \$421,566. This section covers the connection between the new Seventh avenue subway and the existing subway at Times Square. Bids were opened recently for the construction of the two East river tunnels from downtown Manhattan to Brooklyn. The contract was let to Booth & Flinn, Ltd., and the O'Rourke Engineering Construction Company on their combined bid for both tunnels.

OREGON ROADS.—We are told that residents of Roseburg, Ore., have under consideration the question of issuing bonds for \$300,000 in aid of a projected railway from Roseburg west to a point on the Pacific coast, about 90 miles. Residents of Coos county may also issue bonds for this project. N. Rice is mayor of Roseburg.

PENNSYLVANIA ROADS.—The Pennsylvania Public Service Commission will make an inspection of a proposed belt line to be built at Philadelphia which will do away with a number of grade crossings in South Philadelphia. The plans and agreements between the city and various railroads have been submitted to the commission for approval. The commission has approved the contracts for the abolition of grade crossings of the Pennsylvania Railroad in Wilkinsburg and Duquesne, which will cost over \$2,000,000 when completed, and of the abolition

of a grade crossing of the Delaware, Lackawanna & Western at Dundee, near Wilkes-Barre.

SPOKANE, WALLACE & INTERSTATE.—According to press reports, this company has recently let a contract for grading a section of 50 miles between Coeur d'Alene, Idaho, and Wallace. It is understood that the company will also build a number of branch lines. A. J. Devlin, acting vice-president, Wardner, Idaho, and D. R. Treat, assistant secretary. (May 1, page 1012.)

SOUTHWESTERN PACIFIC.—President D. C. Collier is quoted as saying that this company will be incorporated in Utah in June, and that the preliminary financing is accomplished and the organization is practically completed. Actual construction work will begin within two years on the proposed line from Denver, Colo., west to San Francisco, Cal., 1,100 miles. There is also to be a branch line to the Grand canyon. The survey for a considerable distance out of Denver follows the line of the Colorado Midland. (March 13, p. 556.)

TENNESSEE TRACTION & LIGHT COMPANY.—Incorporated in Tennessee with \$10,000 capital to build an electric railway. The incorporators include S. E. Godwin, C. H. Smith, R. G. Farrell and J. N. Vaughan.

TEXAS ROADS.—The Smith Construction Company, Kansas City, Mo., is assembling material at Uvalde, Tex., preparatory to beginning the construction of a railroad from Uvalde north to a point near Leakey, about 40 miles, where large deposits of high grade kaolin are to be developed. Bonuses for \$125,000 have been subscribed in aid of the project by residents of Uvalde and along the route. L. J. Smith may be addressed.

The McKinney-Bonham-Paris Interurban Railway Association has been organized with headquarters at McKinney, Tex., to promote the building of an interurban line from McKinney northeast via Bonham to Paris, about 75 miles. L. A. Scott, R. L. Waddill and J. L. Lovejoy, McKinney; J. W. Russell and Mark McMahan, Bonham; J. F. McReynolds and J. H. Ragsland, Paris, and F. W. Underwood of Honey Grove, Tex., are interested.

TORONTO SUBURBAN.—This company, which started work about two years ago on a line between Toronto, Ont., and Guelph, about 50 miles, has grading work finished and expects to begin track laying soon. The plans also call for putting up a new station at Guelph. The headquarters of the company are at Toronto. (March 8, 1912, p. 454.)

RAILWAY STRUCTURES

CLINTON, IA.—The Chicago & North Western has started work on a new repair yard of 180 cars' capacity with a mill 60 ft. by 150 ft., shop 50 ft. by 100 ft., and other facilities, which will be located near the present shops. The estimated cost is about \$85,000.

DENVER, COLO.—Work on the remodeling of the Denver Union station and track changes in connection with it will begin on June 1, according to announcements made by the Denver Union Terminal Railway.

NEW LONDON, CONN.—An officer of the New York, New Haven & Hartford writes that application has been made to the Public Utilities Commission of Connecticut for permission to build a draw-bridge near the present bridge over the Thames river, also for permission to construct certain approaches and new tracks at New London. It has not yet been determined when the work will be carried out. August 15, p. 314.)

THOMASVILLE, GA.—The Atlantic Coast Line has completed work on the foundations for a new passenger station, it is said, at Thomasville. Material is on the ground for the superstructure and it is expected that the improvements will be furnished by November.

WALLA WALLA, WASH.—The Northern Pacific has authorized the construction of a new depot at Walla Walla at an estimated cost of \$160,000.

WILLISTON, N. D.—The Great Northern contemplates an expenditure of \$150,000 on the line from Williston to Cutbank, Mont. Eight new stations will be erected and 25 water softening plants will also be installed.

Railway Financial News

APALACHICOLA NORTHERN.—On the petition of the Illinois State Trust Company, trustee for \$2,000,000 bonds, L. H. Dimmett has been appointed receiver.

ARKANSAS, LOUISIANA & GULF.—The sale of this road, which was to have taken place on May 16, has been postponed to June 16.

BOSTON & MAINE.—*The Wall Street Journal* says that the report which H. I. Miller has submitted to the Boston & Maine directors favors a consolidation of leased lines with the Boston & Maine. Mr. Miller points out that during the next few years the leased lines have maturing about \$17,000,000 bonds, carrying interest charges of \$670,000 per year. If these bonds are refunded on an average basis of 6 per cent. there will be \$380,000 additional fixed charges per year. Mr. Miller expresses the opinion that the Boston & Maine could get along much better without the Fitchburg than the Fitchburg could get along without the Boston & Maine.

CHESAPEAKE & OHIO.—The regular quarterly dividend of 1 per cent. has been declared on the stock.

CLEVELAND, CINCINNATI, CHICAGO & ST. LOUIS.—The Ohio Public Utilities Commission has authorized this company to issue \$5,600,000 5 per cent. equipment trust certificates at 98. The proceeds of the certificates are to be used to pay for 80 per cent. of the cost of new equipment, the remaining 20 per cent. to be paid for through the issue to car manufacturers of 6 per cent. notes, payable in 18, 30 and 40 months. The permission is granted on the condition that the Big Four shall be relieved from liability under the New York Central equipment trust of 1913, except for 1,000 box cars.

LAKE SHORE & MICHIGAN SOUTHERN.—A committee, consisting of William A. Read, Henry Evans and Willis D. Wood, has been formed to solicit the deposit of minority outstanding stock of the Lake Shore & Michigan Southern and to oppose the terms offered by the New York Central & Hudson River for the exchange of this stock for New York Central stock on the ratio of three shares of New York Central for one of Lake Shore. The committee, in asking for the deposit, says that in its opinion the terms of exchange are "grossly inadequate."

NEW YORK CENTRAL & HUDSON RIVER.—See Lake Shore & Michigan Southern.

NEW YORK, NEW HAVEN & HARTFORD.—Mr. Mellen's testimony is commented on elsewhere in this issue. J. P. Morgan, son of the late J. P. Morgan, has given out a letter to the Interstate Commerce Commission in which he says among other things: "The only reference to me personally which I have found in Mr. Mellen's testimony has to do with the fact that I, as a director of the company, called upon him and told him that a change in the presidency was desirable. For any blame that attaches to that act I accept full and complete responsibility."

"Mr. Mellen in substance charges my father with having concealed from him, president of the company, facts which the president of the company should have known. Every one who knew my father knows this to be untrue. During the last ten years of my father's life he was abroad more than one-third of the time. Mr. Mellen is right in describing my father as a forceful man. He is right also in figuring my father's deep interest in New Haven affairs. The records of my firm and the personal records of my father are still intact; they are available and ready for production before any proper tribunal at any time."

PERE MARQUETTE.—On application of the receiver for permission to issue \$12,000,000 receiver's certificates, Judge Tuttle has been asked to postpone further action. He has, however, it is reported, refused to entertain any alternative other than an immediate sale of the road or the issue of a very large block of receiver's certificates.